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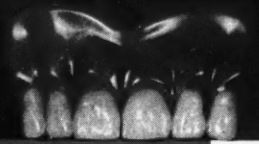

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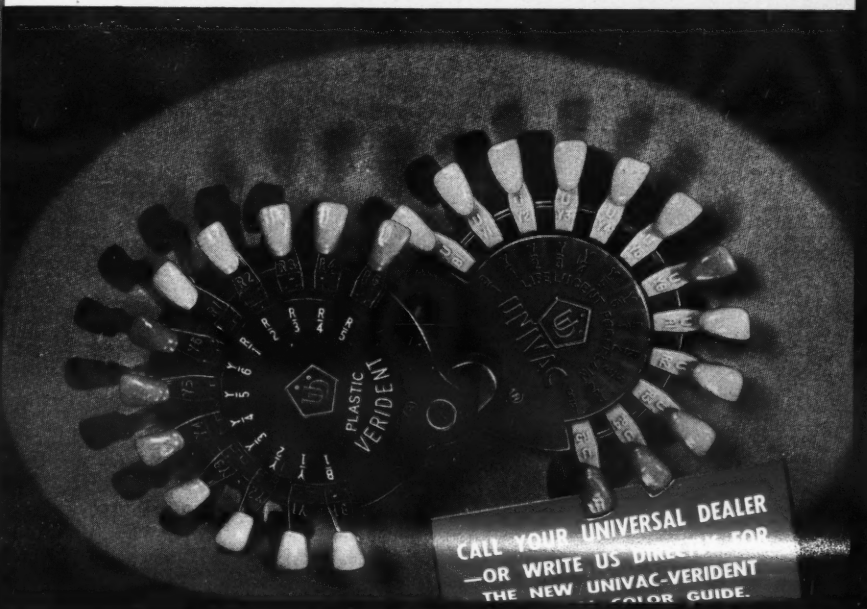

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Frank Nicholas Soraci, B.S. (Manhattan College, 1940), D.D.S. (Columbia School of Dental and Oral Surgery, 1944) completes in this issue the three-part article in which he reports his clinical experiences in the use of the ultrasonic dental unit. His article is Comprehensive Routine Ultrasonic Dentistry.

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UNILATERAL HEADACHES

Caused by an Imbalance of the Masticatory Muscles

WOODROW S. MONICA, D.M.D., Orange, New Jersey
and LOUIS F. RAYMOND, M.D., East Orange, New Jersey

DIGEST

This article which describes the physiology and function of the masticatory mechanism includes two case histories which demonstrate the value of complete mouth rehabilitation in situations where headaches are experienced by patients in the presence of an imbalance of the masticatory muscles.

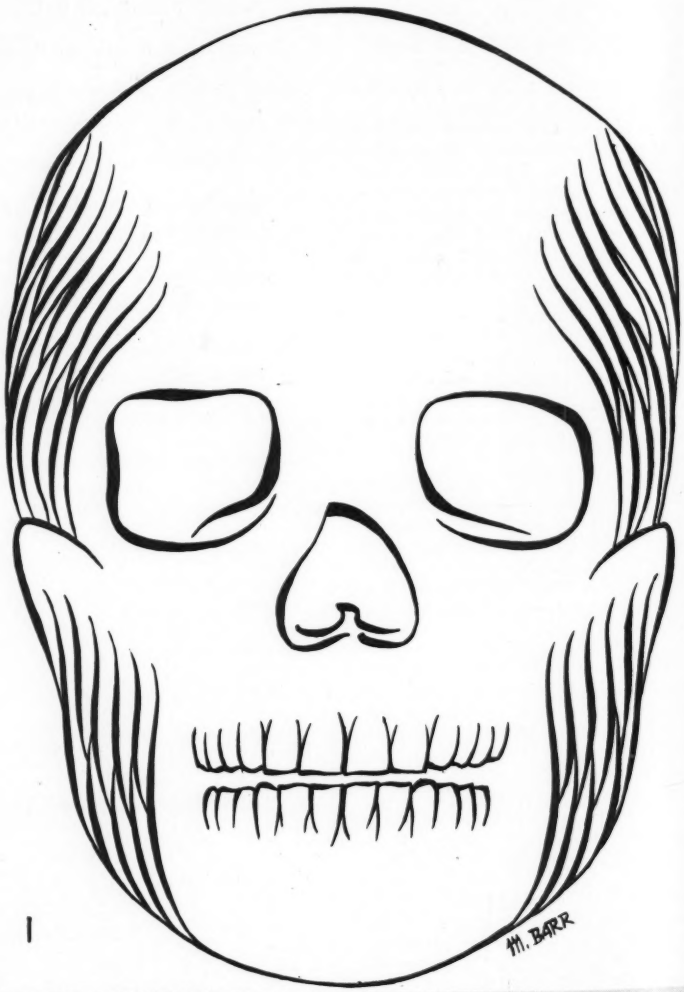
Requirements for Mandibular Function

Efficient mandibular movements depend upon (1) an intact reciprocal innervation system, (2) coordinated muscular contractions, (3) undamaged temporomandibular joints, and (4) a balanced occlusion.

Function of the Reciprocal Innervation System—With sensory fibers in the periodontium, palate, and muscles, the reciprocal innervation system governs the delicate interplay of the masticatory muscles. Afferent neural impulses from these sensory fibers to the central nervous system cause contraction of the protagonistic (working) muscles and relaxation of the antagonistic (balancing) muscles. This simultaneous adjustment of opposing muscle groups ensures efficient mandibular movements.

Diverse Activities of Masticatory Muscles—When an imbalance of muscle-activity exists, as in unilaterally edentulous mouths, the neuromuscular impulses to the antagonists may exceed the physiologic capacity of those muscles to respond in a coordinated manner. These muscles may thus resolve into a partial tetanic contraction or trismus.

Types of Contractions Performed: Masticatory muscles perform all types of contractions: isotonic, isometric, and lengthening (stretching). Protagonistic muscles shorten in isotonic contraction to crush food. This dynamic function accomplishes external function. At the same time, antagonistic muscles contract isometrically (Fig. 2). These muscles retain a constant length, but they develop a ten-



1. ***Shows the rest position of the jaws and musculature.***

sion to oppose the protagonistic forces. This static function, which performs no external work, maintains posture for the mandible.

Maximum Isometric Tension: The antagonists may attain a maximum isometric tension without causing a spasm or a shortening. If the grinding (protagonist) force is greater than the maximum isometric contraction, the antagonists are abnormally stretched.[1] To prevent lengthening and to maintain mandibular posture, the antagonists are excessively stimulated by the reciprocal innervation system.

The Normal Temporomandibular Joint—The temporomandibular joint (a diarthrodial type) is incongruent during mastication except for a small area of contact. Thus, the joint is transformed momentarily into a synarthrodial type.[2] Antagonists, by means of the homolateral condyle, gain support in this manner by pressing on the posteriorinferior surface of the articular eminence. If the joint is deranged, these muscles are likewise overtaxed with stimuli from the reciprocal system.

Mechanism of Balanced Occlusion—The posterior balancing teeth also help support the antagonists during mastication. When those teeth are missing, the protagonistic force exceeds the maximum isometric tension and stretches the antagonists (Fig. 3).

Similar to Action of Lever: In unilateral edentulous mouths, this action may be likened to a level of the first class: (1) The teeth on the working side (or tough food between those teeth) act as the fulcrum. (2) The protagonistic muscles serve as the power and the antagonistic muscles are the resisting force. (3) The force of the protagonists tends to stretch the ineffectively supported antagonists (Figs. 4 and 5). (4) The latter, in turn, are excessively stimulated through the reciprocal innervation system in order to maintain posture for the working side. (5) The compensatory stimuli exceed the physiologic capacity of the antagonists to remain in isometric contraction.[3]

Extreme Muscle Contraction: The muscles "lock", as it were, in a partial tetanic contraction or trismus.

2. ***Left in picture shows the working side, isotonic contraction. The right in picture is the balancing side in isometric contraction. Left in picture working side. Right, balancing.***

Painful Impulses Transmitted: The trismus usually discharges painful impulses to a referred or to a secondary area on the same side of the head.[3]

Case 1, Referred Pain

The following case report illustrates headaches caused by referred pain.

History—A 30-year-old police officer, extremely tense, suffered daily from headaches in the right frontal area. The headaches started shortly after the extraction of several mandibular molars and the insertion of an upper partial denture. During the day, he gritted the left superior central and lateral pontics; while asleep, he ground his teeth. Several physicians ruled out organic disease.

Treatment—The patient's occlusion was restored with a lower partial denture, a relined upper denture, and occlusal adjustments. One week after oral rehabilitation he was relieved of bruxism, gritting, and headaches. He returned for observation at regular

[1]Fulton, J. F.: A Textbook of Physiology, ed. 17, Philadelphia, W. B. Saunders and Company, 1955, p. 136.
[2]Gardner, Ernest: Physiology of Movable Joints, Physiol. Rev. **30**:150 (April) 1950.
[3]Adams, Raymond; Denny-Brown, D.; and Pearson, Carl M.: Diseases of Muscle, New York, Paul B. Hoeber, Inc., Harper and Brothers, 1954, pp. 83-85.
Raymond, L. F., and Monica, W. S.: Dental Factors in Migraine, Ann. Otol. Rhin., & Laryng. **67**:145-147 (March) 1958.

3. ***Shows exaggerated effect of lever action on the balancing muscles.***

intervals for two years and remained asymptomatic.

Case 2, Secondary Pain

This case report illustrates headaches caused by secondary pain.

History — A 47-year-old nervous stenographer complained of frequent headaches in the left occipital area, and pain over the left condyle and behind the left ear. The headaches started ten years previously after multiple extractions. The upper missing teeth had been replaced by a partial denture. The unilaterally missing lower posteriors were not restored.

Treatment — The patient's mouth was rehabilitated with a lower partial denture and occlusal adjustments. Two weeks later, she was symptomless. The patient was observed at regular intervals for three years and remained asymptomatic.

Comment

The protagonistic masticatory muscles are capable of a far greater workload than is habitually required in contemporary life. Excessive or strained chewing may temporarily cause distress, but the latter condition resolves itself without any prolonged effect on the protagonists.

The antagonistic masticatory muscles are not so well favored because nature does not always provide an adequate compensatory mechanism for missing teeth. Many patients with unilaterally missing teeth experience unusual stress in the antagonists from an imbalance of the neuromuscular impulses. These stimuli may contribute to abnormal nervous reactions such as gritting and clenching.

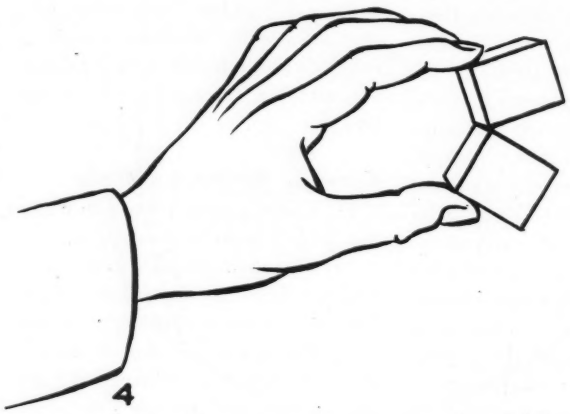
Summary and Conclusion

In a study of 25 patients with unilateral headaches, 24 were relieved by oral rehabilitation.

In many patients with unilaterally edentulous mouths, excessive neuromuscular impulses stimulate the antagonistic muscles beyond their physiologic capacity to remain in isometric contraction. The result is a partial tetanic contraction or trismus.

The pain caused by trismus may spread to a referred or to a secondary area on the same side of the head.

If unilateral headaches are caused by an imbalance of the masticatory muscles, the headaches may be relieved by oral rehabilitation.



4. ***Schematic drawing of the stretching action of protagonistic muscular contractions in unilaterally edentulous mouths.***

UPPER ANTERIOR BRIDGE

with Nonparallel Cuspids

GEORGE F. EISENBRAND, D.D.S., Wilmette, Illinois

This article presents a step-by-step procedure for completing a bridge of four teeth to replace the four upper incisors in a patient whose cuspids were not parallel, and where it was inadvisable to make them parallel by grinding. Each step in the technique is illustrated.

Problem

In the four upper incisors the pulps were dead and extreme apical pathology existed as a result of a football accident (Fig. 1). Extraction was decided on. As the cuspids were definitely not parallel and to parallel them by grinding would endanger the pulps, a special technique was devised. The following steps were taken:

Procedural Steps

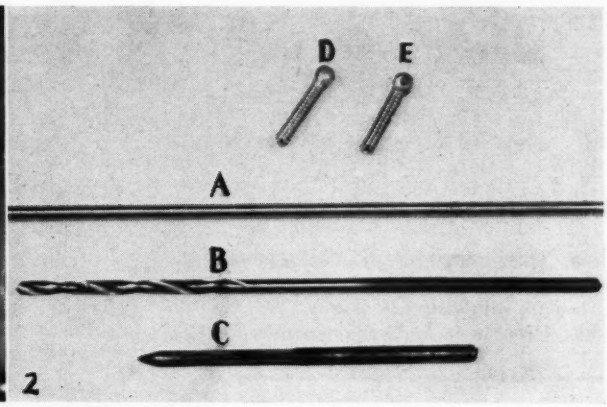
Step One—Standard three-quarter crown preparations were made on the cuspids, routine impressions and bite taken, and models were made and articulated in standard fashion. The incisors were cut from the model and Trupontics® were selected, ground and set up, and the pontic casting made.

Step Two—A length of .051 hard clasp wire with standard thread was procured (Fig. 2A). A corresponding drill (Fig. 2B), and tap (Fig. 2C) were also employed. The wire was cut into four ½-inch lengths. A ball was formed on the end of each length by heating with an oxygen torch (Fig. 2D). The ball was then ground square (Fig. 2E) to make a bolt head.

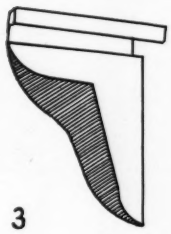
Step Three—Part of the lingual of the two centrals was cut away, beveling at the incisal and at the gingival, as shown in the shaded portion of Figure 3. A wax impression was made for a splint to replace the ground-away portion. This was cast, finished, fitted, and seated carefully. Two holes were drilled through each central and splint, holding the splint in place (Fig. 4) during this step.

Step Four—The splint was removed and tapped, and the holes were enlarged in the backings until the bolts were free (Fig. 5).

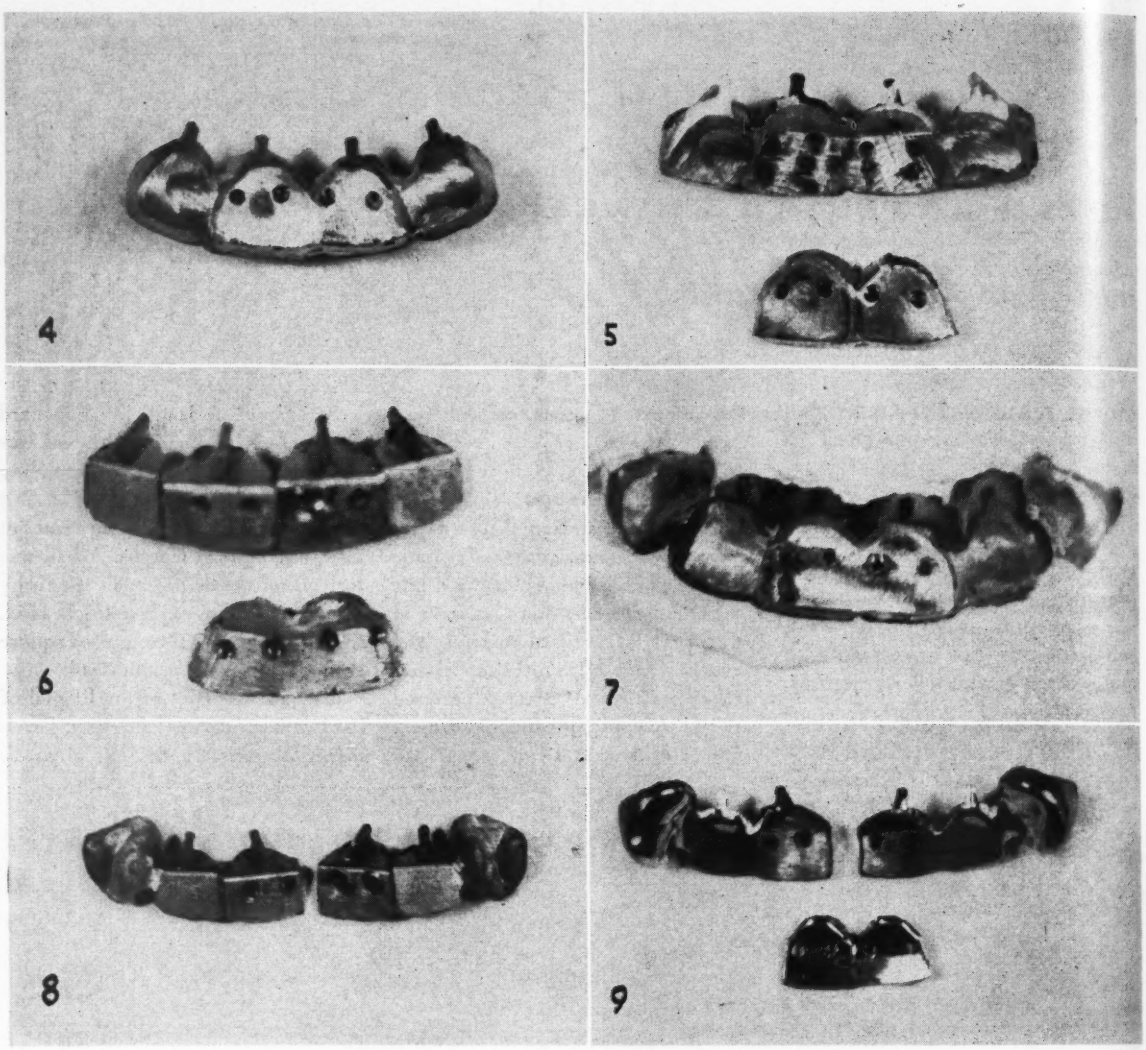
1. *Picture of teeth when patient presented.*



2. *Forming of wire bolts as described in text.*



3. *Cross section. Shaded area shows gold removed on lingual of central castings.*



4. ***Holes drilled through backings and splint.***
5. ***Splint removed and tapped, and holes enlarged in backing until bolts will be free.***
6. ***Holes in backings countersunk on labial.***
7. ***Backing and splint ready for investment, and soldering.***
8. ***Bridge sawed in half.***
9. ***Finished and polished.***
10. ***Teeth extracted.***

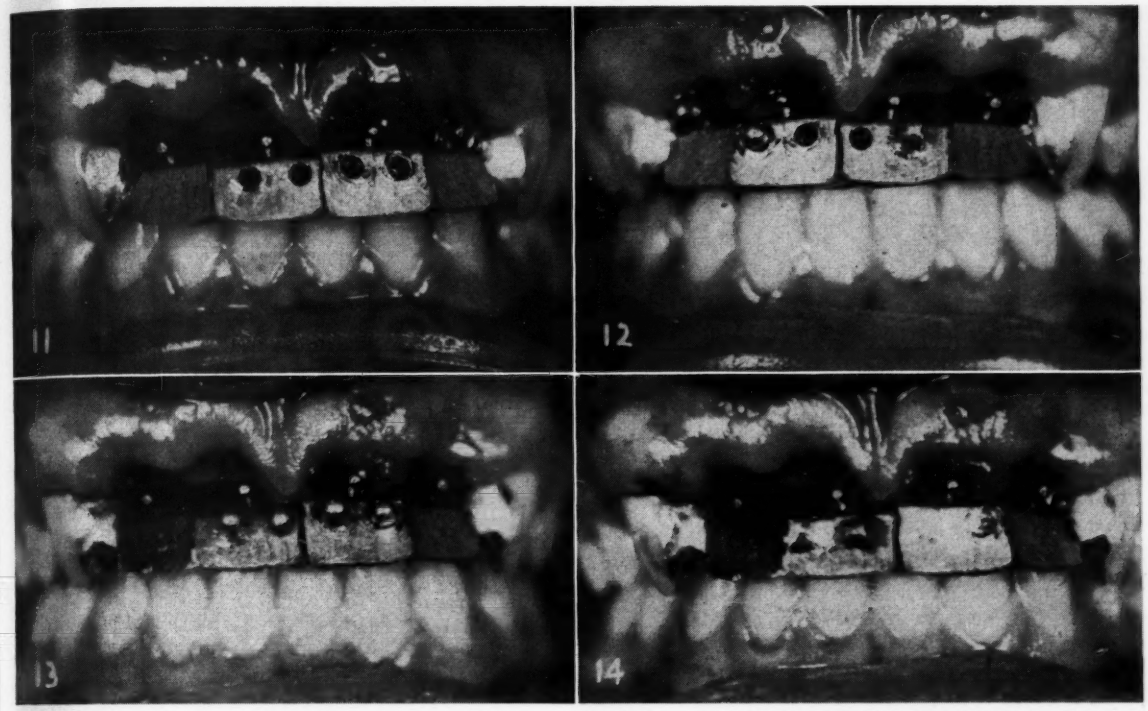
Step Five—The holes were slightly counter-sunk in the labial of the backings (Fig. 6).

Step Six—The pontics were put in place and the span positioned and soldered to the two abutments in the standard manner (Fig. 7).

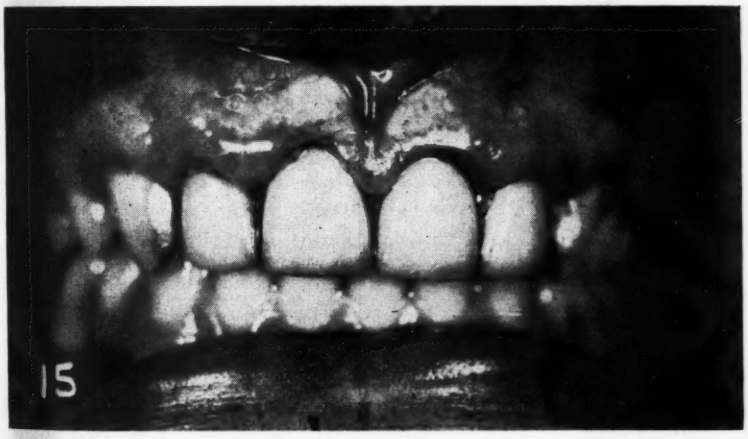
Step Seven—The backing was sawed apart between the centrals, using a 6/0 fine jeweler's saw (Fig. 8). The entire bridge was finished and polished (Fig. 9).

Final Steps

1. An appointment was made with



11. *Two halves of bridge in place.*
12. *Bolts in place to test for fit.*
13. *Bridge cemented and bolts drawn up tightly.*
14. *Bolts ground off flush with backings.*
15. *Facings cemented to place.*



the patient. The teeth were extracted, (Fig. 10) and each half of the bridge inserted (Fig. 11).

2. The splint was put in place and the four bolts screwed in as a final test for fit (Fig. 12).

3. The bolts and bridge were removed, the teeth cemented on each half temporarily, and the two halves of the bridge set temporarily, leaving out the bolts and splint. The patient was dismissed for three days. On his return the sections were removed and cleaned and the abutment teeth cleaned.

4. The two halves of the bridge were cemented separately. After the cement was set, the splint was replaced and the bolts drawn up tightly, using small nose pliers on the square heads (Fig. 13).

The protruding lingual part of the bolts was ground off and polished. The bolt heads were ground flush with the backings (Fig. 14).

6. The facings were cemented to place on the bridge (Fig. 15).

Conclusion

After three years in place, the bridge is still solid and functioning perfectly.

1137 *Central Avenue*

Comprehensive Routine

ULTRASONIC DENTISTRY

Part Three

FRANK N. SORACI, D.D.S., Yonkers, New York

DIGEST

In this final installment of a three-part article which reports the results of a comprehensive routine use of the ultrasonic unit in general dentistry, the author considers the ultrasonic technique particularly suited in prophylaxis, and root canal therapy, and describes in detail important factors involved in the operation of the unit.

Prophylaxis and Calculus Removal

For the removal of gross stain and calculus, the unit is extremely effective and rapid. It is gentle for the patient and simple and less fatiguing for the operator. With the Cavitron periotips, it is possible to perform complete calculus removal and prophylaxis (Figs. 22, and 23) in one sitting for the average patient. The periotips are used with plain water and at a lower power output. No damage is done to the soft tissue and no pressure or pain is felt, even when performing deep scaling.

Root Canal Therapy

The ultrasonic unit is especially useful in root canal therapy for the patient who presents with swelling of the mouth from infected teeth. In these cases, a local anesthetic is nearly always contraindicated. The following procedure, therefore, is completed:

(1) After x-ray examination an opening is ultracarved into the tooth surface. This involves virtually no discomfort, since only two ounces of pressure are required for the ultracarving process.

(2) The ultrasonic root canal hub is placed into the handpiece.

(3) The proper barbed broach is selected and tightened to the ultrasonic hub.

(4) The power knob of the cavitron is set between 20 and 30.

(5) Proper tuning is made with the unit running with water.

(6) The barbed broach is placed into the canal and the pulp is removed in seconds, almost without discomfort.

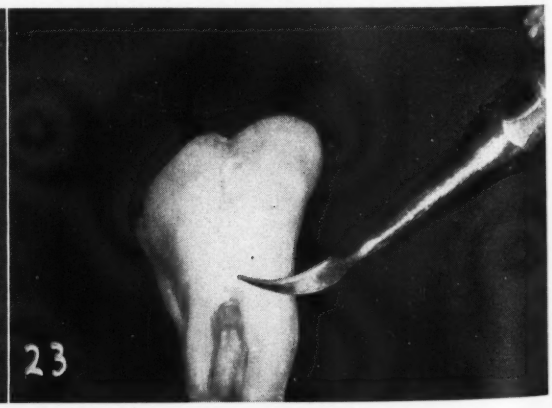
Further root canal treatments, at subsequent appointments, can be continued with the ultrasonic unit or in the routine manner. A detailed description of the ultrasonic technique is presented by Richman.[13]

Operating Aids and Methods

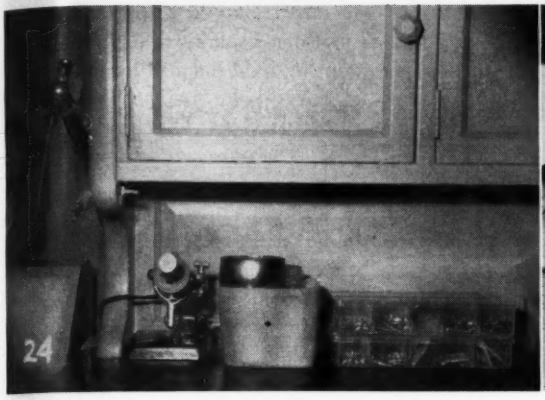
(A) *Changing of Cavitip*—To simplify the changing of the cavitip, the small wrench employed is bolted to the dental cabinet (Fig. 24). An air cut-off and motor tool are placed above it. The air cut-off is for drying away the alcohol used to clean and sterilize the handpiece each time a tip is changed.

[13]Richman, Michael J.: The Use of Ultrasonics in Root Canal Therapy and Root Resection, J. D. Med. **12**:12-18 (January) 1957.

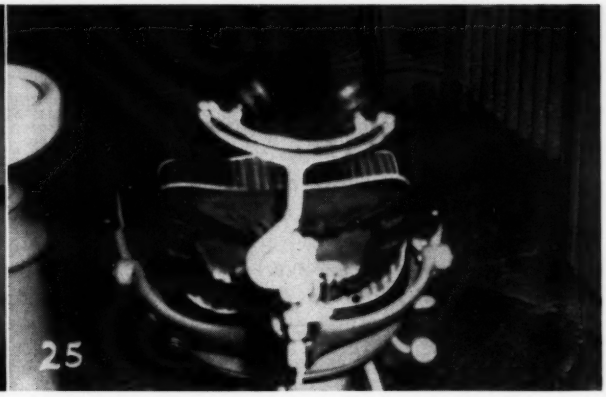
22. *Extracted molar with gross stain, calculus, cervical erosion and caries.*



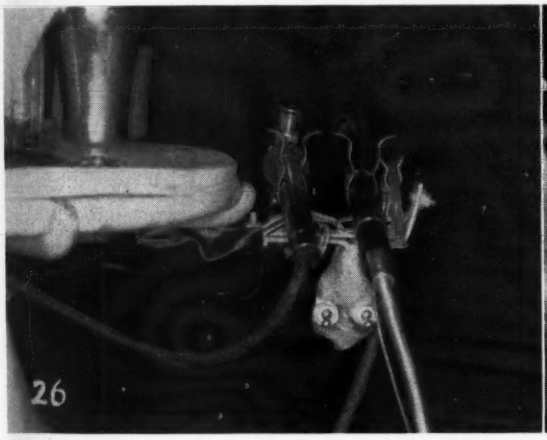
23. *The molar shown in Figure 22 cleaned with the ultrasonic periotips and water.*



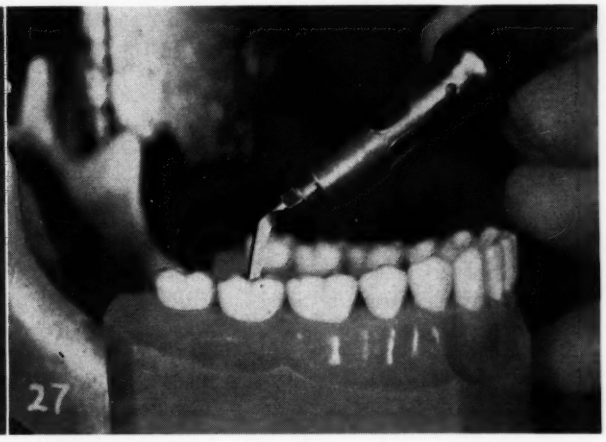
24. *Accessories in position for operating convenience. Left to right: air cut-off, cavitip wrench, motor tool with grinding stone, plastic container with alcohol and waste bottle, and a cavitip compartment box.*



25. *Illustration of operating angulation of chair and permanent location of ultrasonic unit. The unit is about two feet from right arm of chair.*



26. *Operating arrangement of air cut-off, aspirator switches, ultrasonic handpiece, and ejector from aspirator.*



27. *Position of operating fingers on ultrasonic handpiece.*

Few Changes of Cavitips Necessary: The motor tool with its grinding stone is used to square-off, reshape, or sharpen the cavitips when necessary. The motor tool saves the time and energy needed for reaching for the rotary drill. But mainly, it eliminates the patient's fear of using the old drill. Few changes of the cavitips are necessary during a normal day's operation.

Auxiliary Handpiece Available: In addition, the ultrasonic manufacturer has recently designed an auxiliary handpiece for prophylaxis and calculus removal. In this lighter handpiece, the screw thread attachment is eliminated. Instead, the periodontal tips are easily inserted in a second or two.

Method may be Incorporated in Future Models: It is probable that this rapid method of changing cavitips will be incorporated in the cutting handpiece in the near future.

(B) *Operating Room Arrangement* —The ultrasonic unit should be on the operator's right, adjacent to the dental cabinet (Fig. 25). This facilitates its usage and keeps the unit at a distance from the chair and rotary machine with the following advantages: (1) The unit does not have to be moved, (2) the handpiece is obtained without reaching over the patient, and (3) accessories and cavitips are on the cabinet adjacent to the unit. Everything needed for rapid operation is at the operator's fingertips.

Surgical Aspirator: This is necessary at all times in using the unit, and is placed to the left of the rotary unit. For additional operating ease and speed, an on-off electrical switch for the aspirator is attached to the bracket table supports (Fig. 25).

Three Clamps Employed: Directly above the switch are three clamps. These are used to hold an air cut-off, the ultrasonic handpiece during compression of amalgam, and the ejector tip from the aspirator (Fig. 26).

(C) *Manner of Holding Handpiece* —In using the ultrasonic handpiece, it is never necessary for the operator to place his fingers in the patient's mouth for support. As the handpiece does not rotate, it is motionless and cannot "run away."

It is held lightly, but firmly, in the same manner that an ordinary pen is held (Fig. 27). It is also controlled the same way. In writing, the small finger controls the pressure of the pen on the paper. The pressure of the cavitip on the tooth is controlled in this way. The small finger is placed somewhere along the patient's chin area with just enough pressure to compress the chin. The touch utilized to maintain the small finger on the patient's chin is about equal to that required on the tooth while ultracarving.

Summary

1. The ultrasonic unit is not merely an instrument for operative and crown preparations. It can also be used efficiently for other dental procedures, including root canal therapy, periodontia, prophylaxis, and amalgam condensation.

2. The need for anesthetics has been almost eliminated in all routine operative and crown and bridge procedures.

3. Sharp, precise cuts are easily obtained, eliminating the need for hand instruments for nearly all preparations.

4. With the improved action of the new cavitips, soft extensive caries can be removed without the use of hand excavators.

5. A new, faster method of changing cavitips has been developed for an auxiliary prophylactic handpiece.

6. Both patient and operator are far more relaxed so that more operations can be performed in less time.

7. The author has relegated the rotary drill to the role of an accessory tool for grinding gold, prophylaxis for children, and denture adjustments.

Conclusion

1. The ultrasonic dental unit is a vast improvement over the rotary drill, low or high speed, because by eliminating rotary motion, it eliminates vibration, heat, and noise, the major causes of pain and apprehension in dentistry.

2. It is the most versatile and patient-accepted unit that has been designed for the dental profession.

3. As dentists develop a proper knowledge, understanding, and appreciation of its value, professional acceptance of the revolutionary ultrasonic method for almost all dental procedure will become general.

23 *North Broadway*

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ANNOUNCEMENT OF BOOKS RECEIVED

ATLAS DEL TRATAMIENTO DEL PARCIALMENT DESDENTADO, By Adelberte D. Rebossio, D.D.S., Buenos Aires, The University of Buenos Aires, 1958.

MOTIVATING PATIENTS FOR MORE EFFECTIVE DENTAL SERVICE, By J. Lewis Blass, D.D.S., Philadelphia, J. B. Lippincott Company, 1958. Price $6.50.

INTRODUCTION A LA CLINIQUE ODONTO-STOMATOLOGIQUE, By Charles Ruppe, New Edition, edited by Lucien Lebourg, and Maurice Henault, Paris, Julien Prélat Publisher, 1958.

CLINICAL ENZYMOLOGY, Edited by Gustav J. Martin, Sc.D., Boston, Little Brown and Company, 1958. Price $6.00.

ORAL PATHOLOGY, By William G. Shafer, B.S., D.D.S., M.S.; Maynard K. Hine, D.D.S., M.S.; and Barnett M. Levy, A.B., D.D.D., M.S., Philadelphia, W. B. Saunders Company, 1958. Price $15.00.

CLINICAL PERIODONTOLOGY, By Irving Glick, B.S., D.M.D., ed. 2, Philadelphia, W. B. Saunders Company, 1958. Price $17.50.

HISTORY OF DENTAL LABORATORIES AND THEIR CONTRIBUTIONS TO DENTISTRY, By Robert J. Rothstein, Philadelphia, J. B. Lippincott Company, 1958. Price $7.50.

COMPLETE DENTURE PROSTHESIS, By Daniel H. Gehl, D.D.S., and O. M. Dresden, D.D.S., ed 4, Philadelphia, W. B. Saunders Company, 1958. Price $11.00.

THE GATEWAY TO HEALTH, By Ira Jay Berlove, D.D.S., M.D., New York, Whittier Books, Inc., 1958.

ORAL ROENTGENOGRAPHIC DIAGNOSIS, By Edward C. Stafne, D.D.S., Philadelphia, W. B. Saunders Company, 1958. Price $15.00.

Orthodontic-Prosthetic Approach in OCCLUSAL RECONSTRUCTION

MURRAY N. RUBINSTEIN, D.D.S., New York

DIGEST

In cases involving minor correction of deviated teeth, the general practitioner may assume the possibility of repositioning them. In more progressed conditions, however, cooperation between the orthodontist and prosthodontist is advisable. A somewhat complicated case of this kind is discussed herein. Integration of periodontic-operative and orthodontic treatment in proper sequence made successful completion possible.

Objectives in Treatment

Carranza[1] has well stated: "The goal of treatment of occlusal trauma must be the achievement of an occlusion functionally satisfactory for the supporting structures. To this end it is necessary to eliminate as far as possible all premature contact and interferences, to seek a wide distribution of forces with an axial incidence and to enable the jaw to glide smoothly without interference. This may be achieved by (a) so-called selective grinding, (b) orthodontia, (c) prosthodontic measures."

Accurate Centric Relation Necessary—Long standing occlusal disharmonies result in an acquired habitual position of the mandible. McLean[2] termed this "a convenience relationship." This is the position wherein the teeth occlude although one or both condyles may be out of normal position in the fossae. It is caused by the development of an abnormal neuromuscular habit resulting from attempts to avoid occlusal prematurities. The end result imposes strain which displaces the condyles, thus preventing registration of accurate centric relation.

Specialized Assistance of Value—The author[3] has presented in previous articles various techniques for the minor correction of malpositioned and drifted teeth. In cases where radical movement is required, however, the orthodontist's skill is an additional benefit. It is wiser to request specialized assistance in the treatment of reconstruction than to assume the risk of additional hazards. The orthodontist is qualified to determine the correct approach in cases of advanced shifting of teeth. When the teeth have been repositioned to their best possible relationship, the practitioner may complete the operative and prosthetic stages of treatment according to requirements.

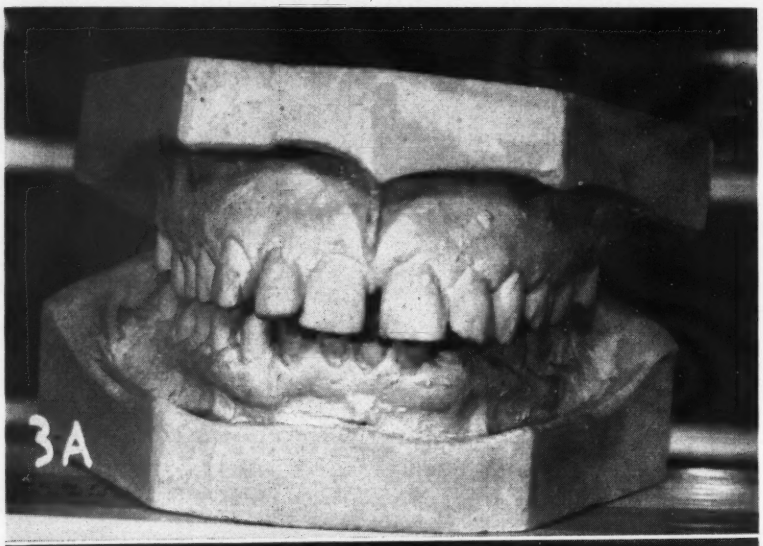
Multiple Problems of Occlusal Reconstruction

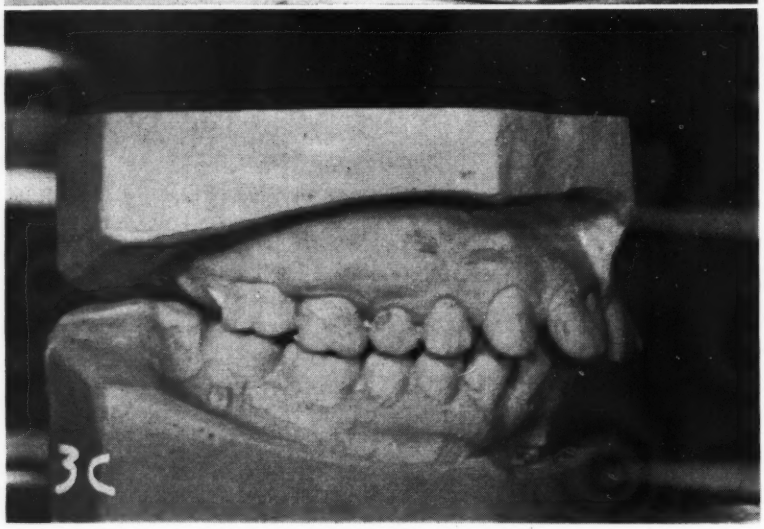
The problems that confront the dentist in the approach to occlusal reconstruction present a complex. A routine or regimen that will secure successful management according to established principles is an advantage. Frequently, in this type of case there is a need for surgery, periodontal care, orthodontia, and prosthodontia. The correlation of these procedures in properly timed sequence is essential to ultimate success.

[1]Carranza, F. A., et al.: Periodontal Disease Therapy, Internat. D. J. **7**:215 (June) 1957.
[2]McLean, D. W.: Pathologic Occlusion; A Major Clinical Problem, JADA **21**:239 (Dec.) 1944.
[3]Rubinstein, M. N.: Approach to Reconstruction, DENTAL DIGEST **61**:3:112 (March) 1955.

1. *Lips at rest. Teeth protrude.*

2. *Intraoral view.*





Removal of Teeth May be Necessary—In the case of a severe periodontal condition, removal of hopeless teeth will facilitate repair simultaneously for the alveolus and adjacent periodontal pocket.

Use of Acrylic Splint—Early introduction of an immediate acrylic splint on prepared teeth so involved will aid in their healing because of stabilization secured through this procedure. As treatment proceeds, immediate splinting will be of further value in repositioning teeth, using the splint as anchorage. Interruption of periodontal treatment throughout all the procedures will not be necessary.

Test Patterns Recommended—It is recommended that in the management of occlusal reconstruction liberal use be made of test patterns of acrylic or metal construction to predetermine the acceptability of the projected rehabilitation. This will ensure functional acceptance of the treatment plan.

Specific Problem Described—For the purpose of illustration the procedure followed in a complex problem case is described from the inception of treatment to its conclusion. In previous articles, general suggestions for case management in rehabilitation have been presented. The procedures in this case observe the recommendations already stated.

Preliminary Steps

(1) A complete x-ray series including bitewing views were taken. These disclosed marked alveolar loss throughout the mouth. The teeth indicated as hopeless were the upper right and left first molars; they were marked for extraction.

(2) Photographs of the face were taken in profile and front view (Fig. 1). Intraoral views were also recorded (Fig. 2).

(3) The patient's medical history and general health inquiry disclosed no underlying systemic factors.

3A. ***Preoperative models, anterior projection.***
3B. ***Left side projection. Note anterior overbite.***
3C. ***Right side projection Diastemas prevail throughout anteriors.***

(4) Accurate alginate impressions were taken for study casts. These impressions were poured twice for duplicate models. The first set were mounted on an adjustable type articulator with a tentative wax check bite for registration. The second set were filed for reference purposes (Figs. 3A, 3B, and 3C).

Clinical Correlation—Using the information obtained, a clinical dental survey was made:

(a) The anterior teeth had attained a generalized mobility and diastemas were present in both upper and lower teeth.

(b) The gingivae were edematous and bled profusely on touch.

(c) The upper anteriors had migrated labially and the laterals were in torsi-version.

(d) There was a marked overbite.

(e) The patient complained of generalized dental discomfort and occasional clicking in the temporomandibular region.

(f) Study of the teeth disclosed many restorations, none of which had been restored beyond a flat surface; no attempt has been made to restore the teeth morphologically.

(g) Further inquiry disclosed the presence of multiple food impaction areas which contributed to the periodontal delinquency.

(h) The patient recounted that her teeth had been previously ground to "achieve a better bite." The untreated teeth remaining did present an appearance of marked wear.

(i) There was an opened bite at the region of the left first molar, and bicuspid.

Survey of Conditions—It was evident from study of the clinical survey that closure of the vertical dimension was increased by the loss of cusp form induced by faulty restorations and injudicious grinding of the remaining teeth. This resulted in increase of the anterior overbite with the associated result of abnormal pressures on the anterior teeth resulting in their displacement. It was obvious that the periodontal condition was also impaired by these factors. This conclusion was corroborated by observation of the patient's interocclusal space which was approximately 5 millimeters. The general picture as presented could account for the clicking of which complaint was made because of alterations of the condylar path due to occlusal collapse.

Treatment Planning—In planning overall treatment the following aspects were considered:

(a) Periodontal: Except for the upper first molars already noted as hopelessly involved periodontally, it was decided to attempt to retain all the remaining teeth. This type of case usually responds favorably if stabilized. The patient was accordingly advised that her response to treatment would be the guide to success in retaining the remaining teeth.

(b) Vertical Height: It was decided to restore the occlusal plane approximately 2 millimeters divided evenly between upper and lower, using full coverage splinting of all posterior teeth.

(c) Repositioning: It was decided to reposition the anteriors and to eliminate the diastemas. Inasmuch as the patient stated that this condition had become active within the last five years, it was believed that their return to normal positions was possible and would obviate the need for jacket crowns.

(d) Consultation: At this stage a conference with an orthodontist resulted in the opinion that this case was Class II, Division I, and that based on the radiographs and the clinical picture, treatment at this time was inadvisable. After discussion, it was decided to (1) proceed with the periodontal treatment, (2) restore the vertical height, and (3) to reevaluate the projected correction at completion of this stage of treatment.

Case Presentation—A blueprint of the proposed treatment was prepared on a chart for presentation to the patient. A straightforward discussion of all the ramifications of the case must be held with the patient. He must be told of all the possible risks and costs involved, and must also select a method of payment. It is far better patient-relationship to provide for contingencies in advance than to be embarrassed by having to explain an unexpected failure in procedure.

Therapy Included—In the plan proposed to the patient provision was made

(a) for complete periodontal treatment

(b) removal of upper first molars

(c) complete splinting of all lower bicuspids and molars and fixed partial prosthesis in the upper, restoring the first molars by two four-piece bridges, connecting the bicuspids and molars

(d) application of orthodontia after preliminary treatment as discussed, if necessary.

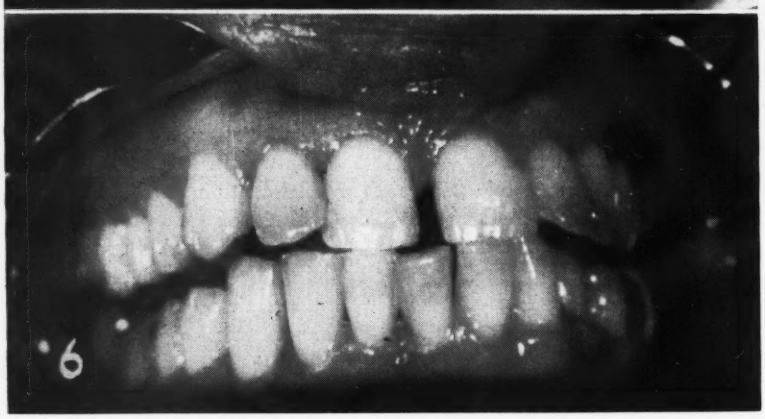
Treatment—Treatment was begun with the insertion of a Hawley bite plane with labial frame and palatal shelf, restoring 2 millimeters of vertical height. Within 48 hours clicking of the temporomandibular joint was eliminated and patient comfort restored. Periodontal measures were then instituted and continued on a regular weekly basis with progressive improvement.

Measures Employed In Treatment

The bite plate was slightly trimmed in the first week of wear to stabilize the opening at an increase of about 2 millimeters in height. The patient was advised to wear it 24 hours a day with the exception of meal times when it was cleaned. In most painful cases, the Hawley bite plate provides dramatic relief because it frees the musculature from false guidances induced by occlusal disharmony, thus permitting a return to normal function and thereby bringing the mandible to its true position.

Measures Prepared—After several visits for periodontal treatment it was decided that treatment had proceeded successfully enough to begin restorative procedures: It was planned (1) to prepare all the posterior teeth, (2) extract the upper first molars, and (3) to restore all with immediate self-activating acrylic bridges.

Impression Taken—(1) An immediate alginate impression (Fig. 4) of the upper was taken, and placed in a bowl of water.



(2) The four bicuspids and both second molars were then prepared and band impressions were taken.

(3) The first molars were extracted.

(4) The alginate impression was dried and, after thoroughly lubricating with petroleum jelly all teeth and surrounding mucosa, the posterior areas were filled with a tacky mix of freshly prepared acrylic, inserted in the mouth, and held in place for 7 minutes.

Immediate Bridges Completed—Upon removal of the impression two excellent immediate acrylic bridges (Fig. 5) which will be exactly the dimension of the teeth (Fig. 6) prior to operative procedures will have been fabricated. The Hawley bite plate will continue to function satisfactorily.

Regular Periodontal Attention—Periodontal care was maintained on the regular weekly basis established as previously described.

Restoration of Lower Teeth—The lower posteriors and bicuspids were prepared and restored with immediate acrylic bridges. Final patterns can now be prepared.

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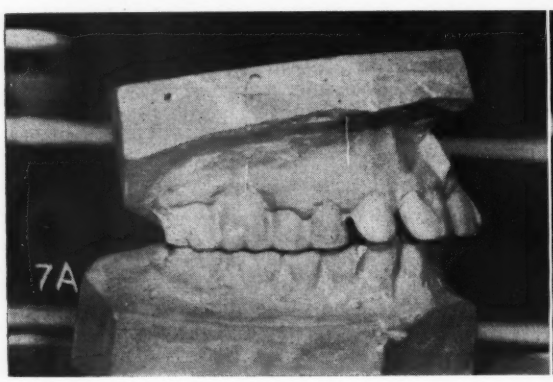
4. ***Alginate impression is taken before crown preparations.***

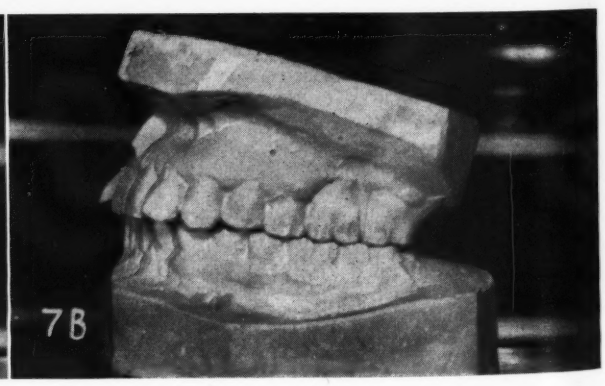
5. ***Immediate bridges in position, upper bicuspids to molars. Bridges are untrimmed. Flash may be noticed over gingival area.***

6. ***Replacements trimmed, polished, and temporarily cemented.***

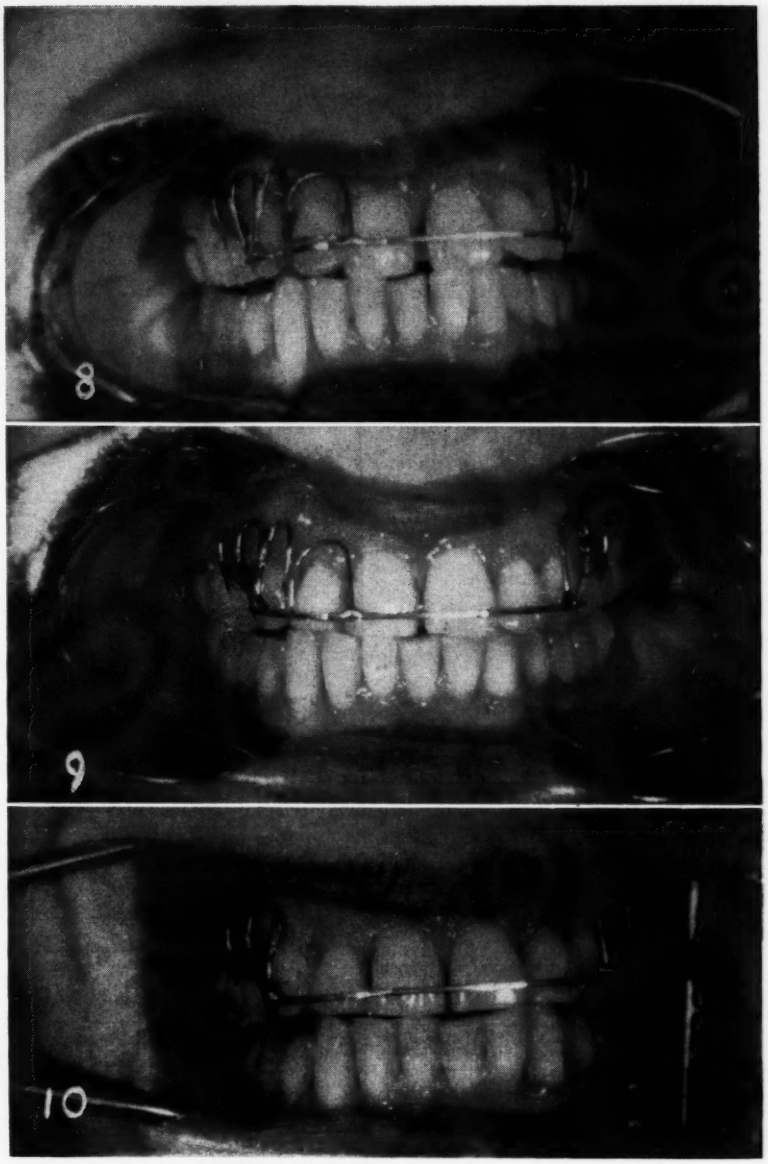
7A. ***Models showing test pattern of planned occlusal correction.***

7B. ***Heat-cured acrylic bridges are in place on both uppers and lowers. Overbite is reduced.***





8. ***Hawley appliance in position.***
9. ***Closure of diastemas begun.***
10. ***Anterior improvement continued.***

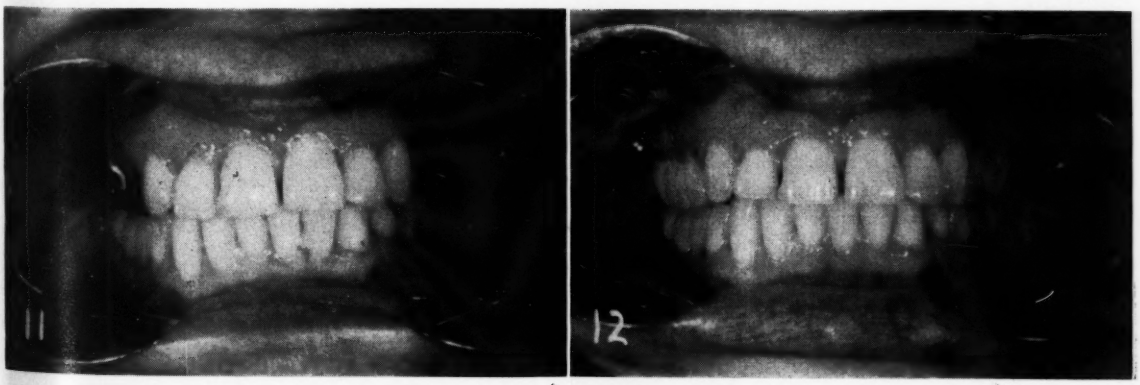


Master Models Constructed

The plaster impressions were taken with metal transfers on all teeth, and in addition on the upper, the Hawley plate was in position in the mouth. The bite registration was taken with the Hawley *in situ* also so that the corrected position of the mandible and proved vertical height as secured by use of the bite plate could be properly maintained.

Occlusal Trial Splints—The mounted models make it possible to construct corrected occlusal trial splints at the established height to prove acceptance of the treatment plan. These bridges (Figs. 7A, and 7B) are made of heat-cured acrylic as this type is more stable. The occlusal pattern can be carved to achieve a desirable occlusal curve and balanced occlusion.

Refinement of Occlusion—The four segments were completed and temporarily cemented. The occlusion was somewhat further refined on a functional basis and the patient was comfortable with the restored height of the posteriors. Further use of the Hawley bite plate was no longer indicated as posterior occlusion was now restored. Two more occlusal adjustments were required to achieve complete acceptance of the contemplated reconstruction.



11. ***Construction of permanent cast veneer posterior crowns according to proved acrylic patterns. Lowers completed. Upper gold bridge in position for testing.***
12. ***Final restorations in position.***

Improvement in Anterior Overbite—Obviously, with the posterior correction in vertical height somewhere under 2 millimeters there was improvement in the anterior overbite. The patient continued under observation once a month.

Second Orthodontic Consultation

Throughout the treatment process, the periodontal condition improved dramatically. Because of the marked improvement, the patient was returned to the orthodontist[4] for a review of the possibility of conservative treatment for the anteriors which would eliminate the need for splinting these teeth. The orthodontist agreed that the improved periodontal status and anterior relationship warranted an attempt at correction of the labial drift.

Orthodontic Correction—The orthodontist made a new Hawley bite plate (Fig. 8) with a stainless steel anterior bow made of flat wire to assure maximum labial contact. The following steps were completed:

1. The upper cuspids were moved distally by the addition of delicate gold finger springs placed gingivally on the teeth to sponsor root movement.

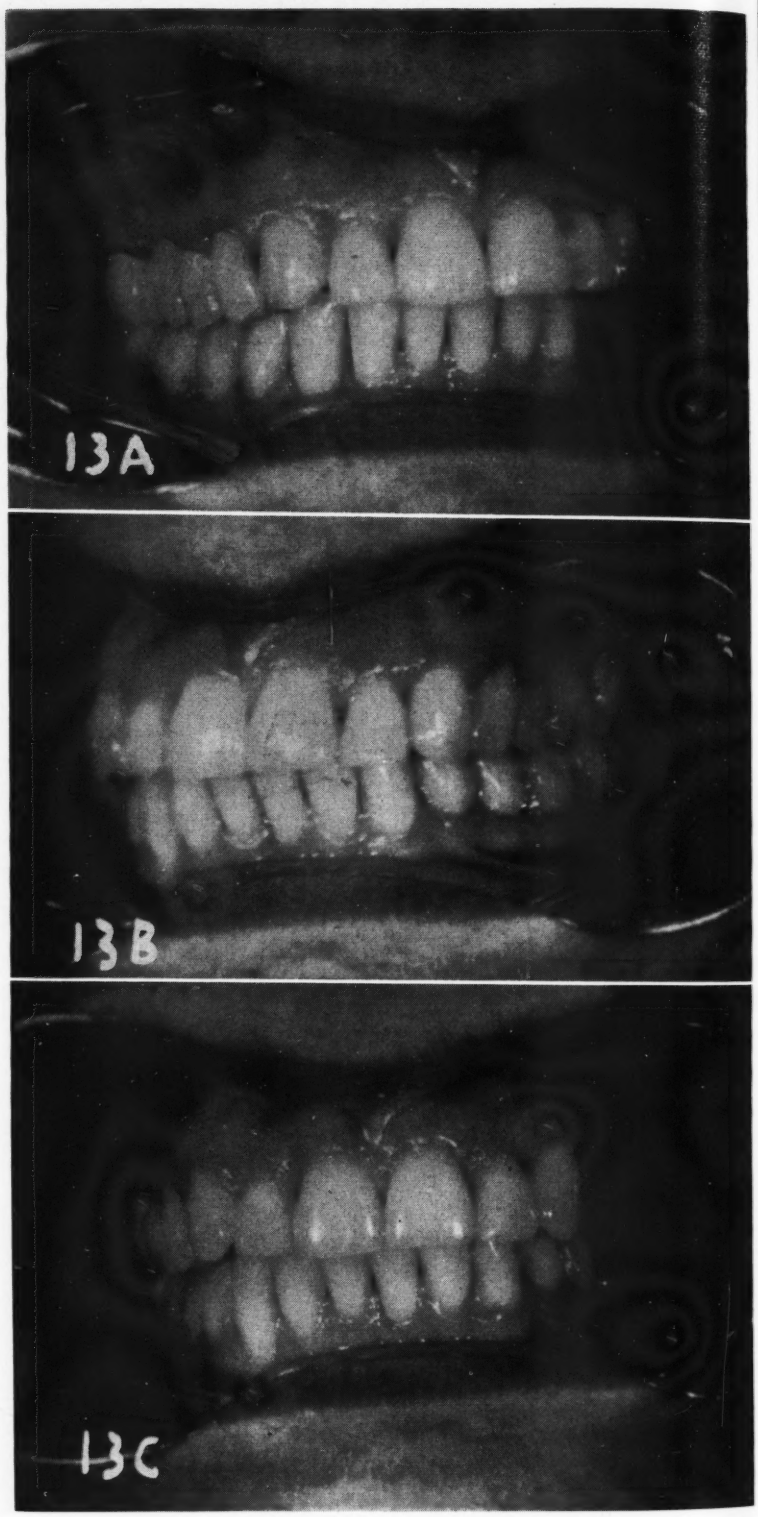
2. As the cuspids moved distally, additional space was made to reduce the four incisors. This was accomplished by tightening the labial bow at the adjustment loops and by the additional rotation springs to the laterals.

3. The centrals (Fig. 9) were further condensed and a light finger spring then incorporated in the acrylic, lingual to the upper right central for labial movement.

4. Maximum reduction was obtained by compressing the labial bow and relieving the palatal acrylic.

5. Finally, the lingual finger spring (Fig. 10) was removed, new acrylic was placed to conform to the lingual anatomy of the upper incisors, and the labial bow was adjusted incisally as a double fulcrum method of retention. The case was now orthodontically stable.

[4]Fine, Herbert: Orthodontia Methodology Report, Personal Communication.



13A. *Completed case (Right).*
13B. *Completed case (Left).*
13C. *Completed case (Anterior view). Notice correction of overbite.*

Completion of Case—After conference with the orthodontist it was determined to complete the case with the permanent restorations—acrylic veneered cast gold crowns at the established relation. Accordingly, the lower master model was remounted against a counter of the working upper restorations, the functionally established and accepted pattern. The lower crowns were fabricated, and the splints completed and cemented with a thin mix of temporary cement.

Bridges Temporarily Cemented—After a trial of about 10 days, an impression of the completed lower was taken for a counter to be used in fabricating the upper gold prosthesis: (1) A bite registration was secured for the purpose of mounting the upper die model. (2) When the upper crowns (Fig. 11) were tried and adjusted, a new master model was secured to register the recovered healed area of the first molar regions to properly fabricate the bridges. (3) These were completed, tried (Fig 12), and cemented temporarily.

Patient Comfort Established—Again the occlusion was refined on a functional basis and patient comfort completely established.

Orthodontic Treatment Continued—Because of the stable acrylic restorations, there was no interference with the orthodontic treatment which proceeded simultaneously with all operative procedures. The orthodontist maintained constant control of the case and succeeded in bringing all the anteriors to normal alinement. When this was achieved, the springs were removed from the Hawley labial frame and the patient advised to use the case as a retainer for night use only (Figs. 13A, 13B, and 13 C).

Conclusion

This case was completed approximately two years ago and has maintained most satisfactorily. Prognosis is excellent. In conclusion, efficient case management will simplify treatment plans in any problem. The proper integration of the various elements in treatment planning in correct sequence will secure the desired result; namely, an integrated occlusion that is functionally acceptable. Liberal use of test patterns assured the operator of the acceptability of the projected reconstruction on a functional basis.

200 *Central Park South*

The Scientist as a Citizen

"I am sure that there is no one, even among those who make the study of medicine a profession who does not confess that all that men know is almost nothing in comparison with what remains to be known. I judge there was no better provision against a short life or lack of experience than faithfully to communicate to the public the little which I should myself have discovered, and to beg all well inclined persons to proceed further and then to communicate to the public all the things which they might discover in order that the last should commence where the preceding had left off, and thus by joining together the lives and labors of many, we should collectively proceed much further than anyone in particular could succeed in doing."

René Descartes, from *The Scientist as a Citizen* by J. R. Schenken, *Science* **121**:184 (Feb. 11) 1958.

Preanesthetic Medication

JAMES E. ECKENHOFF, M.D., and MARTIN HELRICH, M.D., Philadelphia

Summary

Data obtained in a blind study of morphine, meperidine, alphaprodine, secobarbital, and saline solution as preanesthetic medicaments in 1,400 surgical patients showed that secobarbital led to a higher proportion of calm, carefree, yet alert patients than did the narcotics. The latter drugs produced more drowsy or sleeping patients but also a higher incidence of apprehension than did secobarbital. Undesirable side-effects were seen more often after preanesthetic narcotics than with secobarbital. There was little difference in the influence of the various preanesthetic drugs upon satisfactory induction of anesthesia with any given anesthetic agent. The complications of the induction period, however, did vary according to the preanesthetic drug and the anesthetic agent.

Significant Data

Preanesthetic drugs did not appear to influence the maintenance of anesthesia, except that respiratory depression was more common if a preanesthetic narcotic had been given. When narcotics had been given preoperatively, the patient remained narcotized longer after anesthesia than did those who received secobarbital or saline solution, but they did not complain of pain as often nor appear as restless as did the latter groups. These data are significant in the clinical practice of anesthesia.

Adapted from *Journal of the American Medical Association* **167**:421 (May 24) 1958.

Gradual Transition from DENTITION *to* DENTURES *with Minimum Surgery*

FRANK LUNTZ, D.D.S., Middletown, Connecticut

DIGEST

The problem of the mental and physical preparation of the patient for the loss of the natural teeth and conversion to dentures lead to the development of a procedure that eliminated many problems inherent in this situation. The basic principles of the procedure have been expounded by DeVan.[1] With the advent of self-curing acrylic plastic, however, a completely different and simple procedure was evolved for dealing with the patient who presents for tooth removal and full dentures. After the experience of treating a hundred or more cases using this method the author finds that the patient accepts the idea of dentures more readily and adjusts to them with greater facility. This plan may be used in whole, or in part, as best suited to the individual case. Instead of extracting all the teeth at once, the patient is prepared for the extractions gradually and psychologically, and is supported throughout the procedure described herewith.

Examination of Patient

Observe the patient carefully; look and listen for personality traits that reveal his ability to cope with dentures. This will be a guide in adapting the procedure to the patient. Continue the usual routine of inquiry into his general health and the oral examination that naturally includes full mouth x-ray. Note the following factors:

(A) Size and position of the tongue

(B) Position of tongue when swallowing

(C) Tissue and muscle attachments, especially on the floor of the mouth

(D) Relationship of teeth and jaws

(E) Worn cusps for signs of bruxism and movement of jaws

(F) Freeway space, as clenching habits may have shortened muscles and present teeth may be too long

(G) Acutely diseased teeth, root fragments, or elongated posterior teeth which should be removed promptly

Explanation of Procedure and Cost

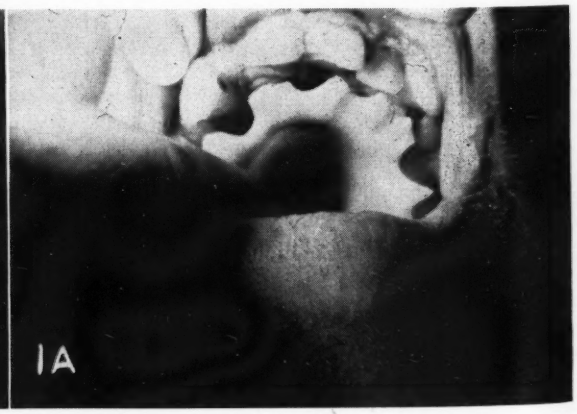
At the first visit, set one fee, which will include x-rays, extractions, immediate dentures, and insertion of subsequent complete "permanent" dentures. This way the patient will not be surprised by additional charges.

Records

(1) Take alginate impressions for models to keep for future reference.

[1]DeVan, Muller: Construction of Temporary Replacements Prior to the Removal of Condemned Natural Teeth, Annals of Dentistry, **7**:104 (December) 1948.

1. *Male patient, age 22, all the upper teeth to be removed.*



1A. *Inserting acrylic base, with no teeth present.*

2. *Woman patient, age 55, when she first presented for full dentures.*

2A. *Upper and lower partials inserted. Incisors replaced in the mouth. Making esthetic corrections.*

Photographs can be made for the same purpose.

(2) Record millimeter measurements from the base of the nose to the tip of the incisors and of the vertical dimension.

Selection of Shade and Shape of Teeth

Match the teeth in the mouth. A shade lighter than the natural teeth seems to please the patient. Slightly smaller teeth are frequently used to advantage.

Training Bases or Dentures

People do not like changes and fear the unknown. Let the patient become accustomed gradually to the necessary changes. Restore the mouth while he continues to have the security and support of his own teeth, however few.

Method to Overcome Difficulties—Gagging and salivary difficulties can be overcome and the patient can accustom himself to the presence of an artificial appliance. The following steps will aid in the transition:

A. Make and insert an acrylic base *without teeth* shortly after the first visit (Figs. 1, and 1A).

B. Add teeth to this base while in the mouth with quick cure acrylic plastic, or replace the base with partial dentures, generally without clasps (Figs. 2A, 4, and 4A).

C. Frequently the patient is wearing a partial denture that may have settled out of occlusion. This can now be realined in the mouth.

Denture Evolved Gradually—In this way the patient becomes accustomed gradually to a full quotient of teeth. It is best, if possible, to maintain the existing opening. However, acrylic stops built over the occlusal of the natural teeth can increase the opening easily, if desired (Figs. 7, and 7A).

Removal of Natural Teeth and Immediate Replacement

A. Under local anesthesia, remove a few teeth at each visit.

B. Pack the socket with absorbent gauze to ensure dryness (Fig. 3).

C. Immediately replace the extracted teeth by attaching artificial ones to the denture bases while in the mouth with quick cure plastic (Figs. 3A, 4B and 5).

Steps Must be Completed in Mouth—Although the ethical dental laboratory is indispensable in the practice of prosthodontics, the above steps *must be done in the mouth* by the dentist for their real effect. They can be completed quickly and easily. Acriline® is recommended. The color

3. *Woman, age 20. Partials worn showing cuspid and first bicuspid removed and socket packed to prevent bleeding.*

3A. *Teeth replaced immediately following extraction.*

is good, it gives consistent results, sets rapidly regardless of weather, and polishes easily. The unions hold well without showing too much demarcation.

Remove and Reinsert Denture—The denture must be removed before the additional teeth are set too firmly around the remaining teeth. It is well to take the denture out and reinsert a few times. Many patients say the acrylic burns at first. If the mouth is rinsed with cold water before and after use, the sensation is reduced. The material seems to have no harmful effects on the tissue. Explaining the smarting to the patient before use will allay his fears. The material is used as a heavy syrup and is flowed into place.

Choice of Tooth to be Removed First—This depends on the condition of the tooth. Extract the badly broken and carious teeth first, leaving those giving the greatest retention to the mouth until last.

Important Point—It has never been necessary in this procedure to trim the alveolus, except to remove sharp points. Avoiding an alveolectomy may make the difference between a lifetime of happiness and satisfaction, or continuous discomfort and constant remakes.

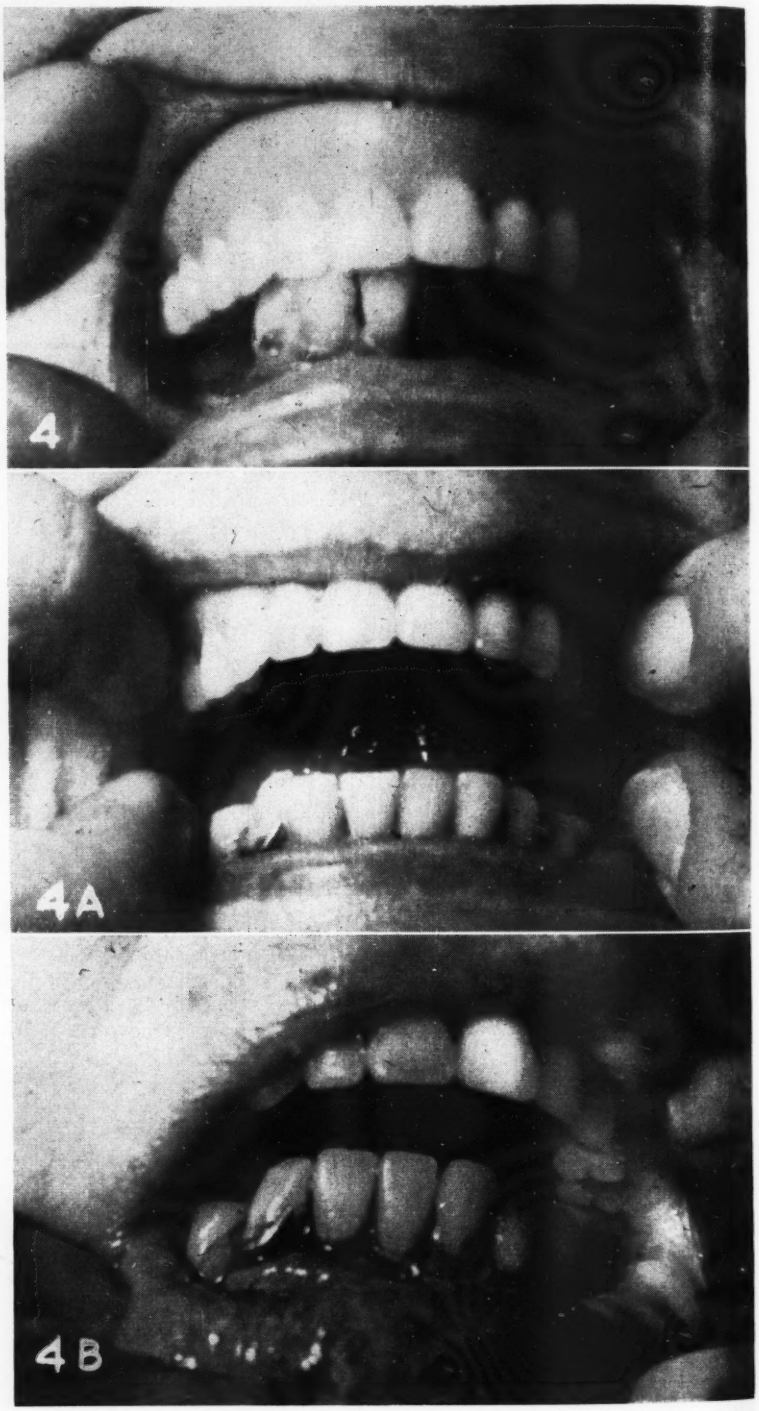
Bony Cortex is Valuable: Many patients who are unable to wear dentures give a history of a previous alveolectomy.

Shrinkage Normal with Age: As years go by, the edentulous person normally has a continuous shrinkage and the less the alveolus is interfered with at the time of removal of the teeth the better.

Jaw May be Shortened—The teeth are butted into the socket. Since bone will resorb to the depth a tooth is inserted in the socket, a jaw may be shortened by simply inserting the tooth deeper.

Patient Satisfaction Ensured—There is no question of the patient being dissatisfied with the ultimate effect, since he has the final choice in color, shape, and position of the individual tooth. The profile, centric, and vertical is retained.

Orthodontic Corrections Made—In replacing the teeth, make the corrections that the orthodontist might make, or restore the teeth to the position they were before periodontal involvement caused migration (Figs. 2, and 2A).



4. ***Woman patient, age 60. A few teeth remaining in the mouth.***

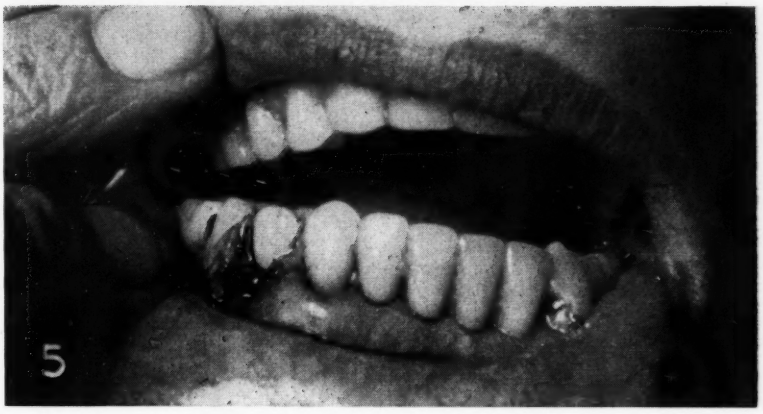
4A. ***Lower partial fitted and worn for a while.***

4B. ***Teeth extracted and immediately added to the partial denture.***

Buccal and Labial Flanges

At the time the teeth are replaced there is no distortion or extra fullness whatever (Fig. 6). After preliminary healing, flanges are added by flowing the acrylic plastic on the gingiva with a denture seated to avoid displacement (Fig. 6A).

Denture is Adapted to Patient—When immediate dentures were first introduced, about twenty-five years ago, with ready-made labial and buccal flanges, the patient would adapt himself to the denture and not return to the dentist until masses of hypertrophied tissue had developed. Then the patient had to go without teeth



5. *Woman, age 45. Lower teeth being replaced. Replacements are butted to the gingival as the teeth are extracted.*

6. *Woman patient, age 39. Upper teeth removed and replaced in the mouth.*

6A. *Flanges added by flowing acrylic into place after healing.*

7. *Woman, age 55. Showing an extreme closure. Lower teeth bite into the palate.*

7A. *Bite opened with acrylic stops and partial dentures. When the patient becomes accustomed to the appliance full dentures are to be made.*

8. *Woman, age 50. Upper and lower dentures constructed by starting with partial dentures.*

8A. *"Permanent" set of teeth constructed with impressions or models retaining the original measurements and position.*

and undergo extensive surgery, and never again had normal tissue. With the present procedure, this situation has not occurred. Since alveolar surgery is kept to a minimum, and there is no element of surprise, the patient suffers little physical or emotional shock.

Transition may be Imperceptible—It is quite possible to change dentures so gradually that members of the family and business associates will not be aware of the stages in the transition.

Final Denture Completed

Frequently after the teeth are removed and jaws healed the surfaces of the mouth are not smooth. DeVan reassures the writer that this is desirable because it aids stability. Now that the jaws are well settled, and the teeth completely built, a new set of teeth retaining the original position (Figs. 8, and 8A) may be made:

(1) Build a lower in the conventional manner to a plaster model of the upper.

(2) While the lower is still in wax, build an upper denture to the lower.

(3) The occlusion can now be improved and balanced and dentures can be processed.

Conclusion

It required many years to acquire the original dentition, therefore, it can be expected to take some time to make the transference to artificial teeth. In the procedure described the dentist is the guide and the patient learns to master the denture without difficulty.

363 *Main Street*

Thumb and Finger-sucking

ALFRED S. TRAISMAN, M.D., and HOWARD S. TRAISMAN, M.D.

Summary

The average age at which the thumb-sucking habit stopped spontaneously was 3.8 years. This is longer than the 2-year limit that has been mentioned. However, cessation of the habit at this age is considered compatible with normal tooth and dental arch formation. If malocclusion is caused by the thumb-sucking, the displaced teeth and arch will spontaneously correct themselves after the sucking has ceased, especially after development of the permanent dentition.

Spontaneous Termination

Dental devices to stop thumb-sucking were not used in enough cases to be truly evaluated. It was found that the habit terminated spontaneously in the great majority of patients, and at an early enough age so that routine use of such a bar was not the usual procedure.

There was no correlation between colic and thumb-sucking.

No correlation was found between psychologic problems and thumb-sucking.

Findings Differ

Previous reports have stated that the majority of patients who sucked their thumbs stopped by 1 or 2 years of age. In this study, 80.8 per cent of those who sucked their thumbs persisted at 2 years of age, while 3.9 per cent of those who sucked their thumbs stopped at 1 year of age or earlier. From these findings it would appear incorrect to tell anxious parents that their child will stop this sucking habit by 1 or 2 years of age.

Adapted from *Journal of Pediatrics* (May) 1958 in *Medical Digest* **25**:89-91 (Aug.) 1958.

The EDITOR'S Page

THE VAST resources of the Mayo Clinic have been used to supply the 1338 x-rays that are used to illustrate the new book ORAL ROENTGENOGRAPHIC DIAGNOSIS by Edward C. Stafne.[1] Anyone who has ever seen a clinical set of x-rays from the Mayo Clinic is aware of their superior quality.

Most dentists make good and frequent use of x-rays. At least most of them either take a series of pictures or have them taken by someone else. Putting a film in a patient's mouth, pressing a button, and processing the film are mechanical acts. The interpretation of the x-ray images is a diagnostic feat. A knowledge of both normal and pathologic anatomy is necessary for an intelligent interpretation, but first the dentist must have before him an acceptable negative from which to make a judgment.

It would be quite impossible to state how many x-ray films that are exposed become acceptable finished negatives. One in ten might be a fair and close approximation. The fault is not usually with the x-ray apparatus or the film. The weakness is usually a human one—poor angulation and placement of the film, faulty timing of the exposure, improper processing. In short, sloppy technique.

In the course of a year an editor of a dental journal sees dozens of x-rays. Not more than 10 per cent are of a high quality.

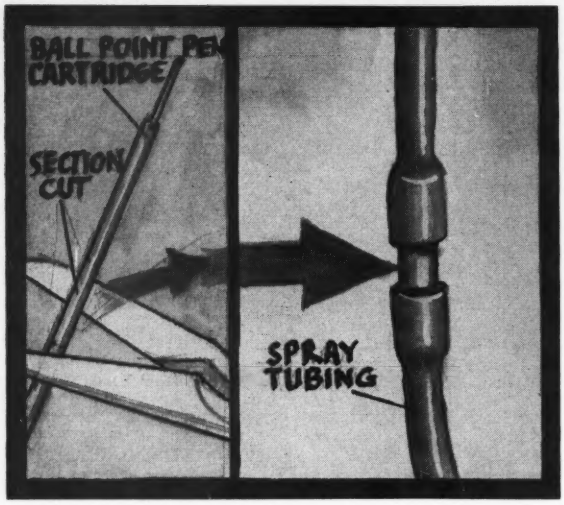
The illustrations in the Stafne book are models of excellence and represent the superior quality that one expects from all laboratory procedures of the Mayo Clinic. By studying these illustrations and the clear text a dentist may ground himself in the appearance of normal tissue. That is the prerequisite for any diagnostic procedure: the character of the normal must be understood before departures from the normal may be evaluated. Next, the dentist may learn from this publication how the different processes of disease change the radio-nature of tissue: either by increasing or decreasing tissue density. Finally, the dentist who studies this book may become familiar with the many systemic diseases that leave radiologic markings in the oral tissues. This phase of interpretation is covered with convincing emphasis in the Stafne book.

The Section of Dentistry and Oral Surgery at the Mayo Clinic is organized primarily for diagnostic integration. Routine dental treatments and restorations are not undertaken. The oral tissues of the thousands of patients admitted to the Clinic each year are examined for possible loci of infection that may contribute to systemic disease. Oral surgery is performed to remove such local infection. As the biologic base of dentistry has been widened the examination of the oral tissues has taken on another meaning: the tissues of the mouth often record and express manifestations of systemic disease.

"The effects of a disease may be manifested by accelerated or retarded development and rate of eruption of the teeth, structural defects, changes in trabecular pattern, and formation of lesions of the supporting bone. These manifestations most often occur in diseases in which skeletal involvement may be a feature, namely metabolic disturbances, granulomatous diseases, skeletal developmental disturbances of unknown cause, reticuloendotheliosis, Paget's disease of bone, and others. In general, abnormalities of development and eruption of the teeth occur in association with systemic disturbances that have their onset early in life; alterations in trabecular pattern and quality of the bone may occur at any time during life. In some instances the dental roentgenographic findings may provide the first clue that leads to an early diagnosis of the disease. Oral manifestations are by no means always present, and even when they are, they may not be of their greatest possible degree."

The pages and the illustrations in the Stafne book that cover the oral roentgenographic expressions of systemic disease are a remarkably clear-cut and practical presentation on this important aspect of diagnosis. The entire book is magnificent.

[1] Stafne, Edward C.: Oral Roentgenographic Diagnosis, Philadelphia and London, W. B. Saunders Company, 1958.



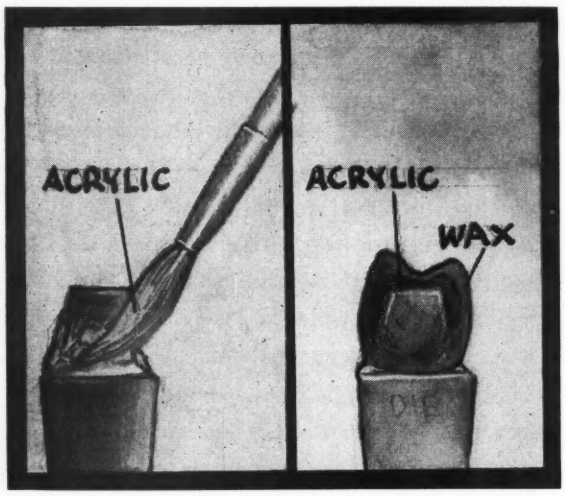
1

Clinical and Laborato

Repair of Air-Water Spray Tubings

U. C. Weight, D.M.D., Eugene, Oregon

1. To repair a break in the metal tubing that is used on an air-water spray unit, use a section from the metal cartridge taken from a discarded ball point pen. If ink remains in the cartridge, soaking in a solvent will remove the ink.

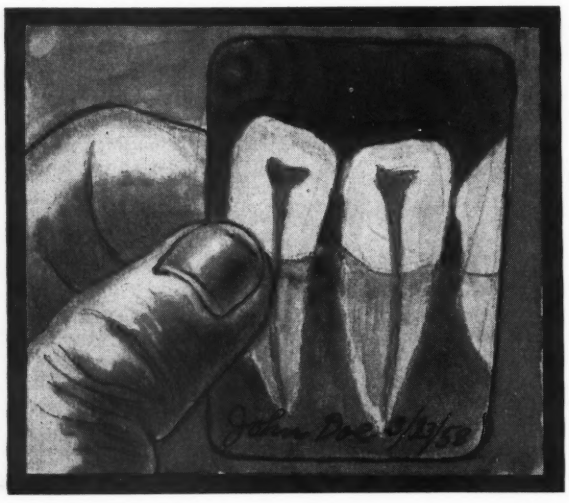


2

Indirect Wax-up of Crowns

Milton Cooperman, D.D.S., New York

2. Apply a *thin* layer of fast setting acrylic to the die. Cover the margins and the entire preparation. When the acrylic is hard, trim to proper form. Build up to full contour with wax applied over the thin layer of acrylic.



3

Identification of X-ray Films

David Waldman, D.D.S., Flushing, New York

3. Use an indelible pencil to write the name of the patient and the date on the film before it is processed.

READERS Are Urged to Collect $10.00

For every practical clinical or laboratory suggestion that is usable, DENTAL DIGEST will pay $10 on publication.

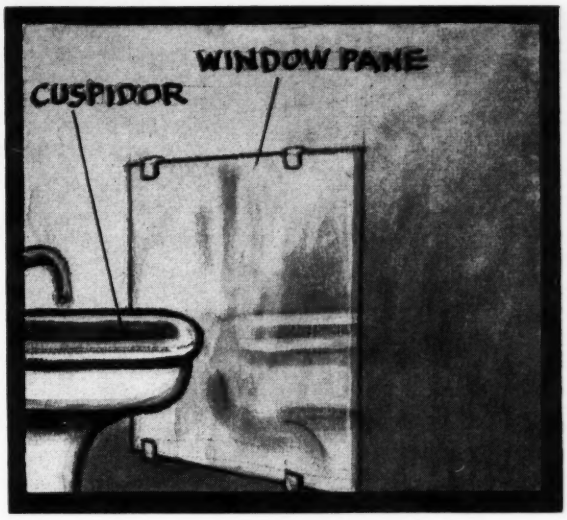
You do not have to write an article. Furnish us with rough drawings or sketches, from which we will make suitable illustrations; write a brief description of the

SUGGESTIONS . . .

Protection for the Wall

William Kach, D.D.S., Garden City, Michigan

4. A piece of window pane fastened to the wall behind the cuspidor will protect the wall against stains and will not interfere with the decorating scheme of the room.



4

A Holder for the X-ray Timer

Alvin H. Claus, D.D.S., Morton Grove, Illinois

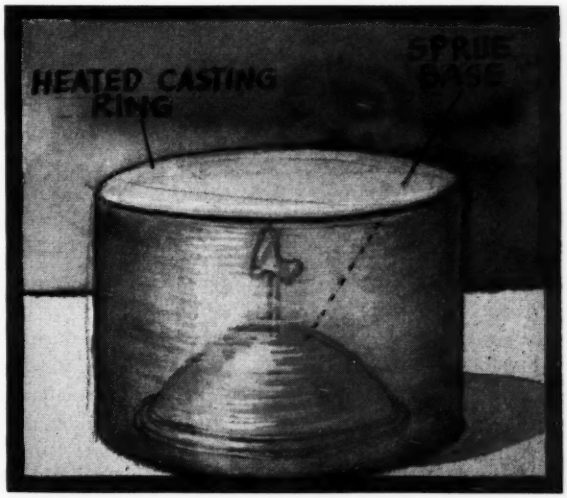
5. A cord-strap and hook that is hung around the neck by saxophone players may be used to hold the x-ray timer. This permits both hands to be free in making adjustments of the patient's head and for proper placement of the film.

5

An Inlay Investment Procedure

C. W. Pratt, D.D.S., Calumet, Michigan

6. If it is necessary to speed the setting of the first painting of inlay investment the sprue former base is placed in a warmed casting ring and covered.



6

technique involved; and jot down the advantages of the technique. This shouldn't take ten minutes of your time. Turn to page 557 for a convenient form to use.

Send your ideas to Clinical and Laboratory Suggestions Editor, DENTAL DIGEST, 708 Church Street, Evanston, Illinois.

MEDICINE and the Biologic Sciences

Chronic Urticaria

The chronic form of urticaria is usually seen in adults. Frequently it is a symptom of endogenous disease rather than being caused by food or other allergy.

One of the common factors in chronic urticaria is psychogenic disturbance, generally associated with resentment in a frustrating situation. Emotional letdown or adrenal depletion may also precipitate the wheal formation.

Other causes include inhalants, such as perfumes and pollens, and physical factors, such as heat, cold, and light. Bacterial infection is responsible in some cases, as in parasitic infestation. Also drugs, including penicillin, sera, vaccines, liver extracts, insulin, and vitamins, may cause trouble.

Malignant neoplasms are often associated with urticaria. Loeffler's syndrome and periarteritis have been observed. Patients with Hodgkin's disease and other lymphomas may have urticaria as a presenting symptom.

In treatment, information regarding onset, timing, other allergies, and emotional background is important. Physical examination should include the rectum and pelvis. Enlargement of liver, spleen, or lymph nodes should be noted and a chest roentgenogram, complete blood count and urine and stool examinations are recommended. Skin tests of only a few foods and inhalants may be advisable.

In most instances the etiology remains obscure and treatment is a problem. Food allergy is eliminated first, using a basic diet for eight to ten days. Sedatives are tried next, using barbiturates and tranquilizing agents as required. Estrogens may also be useful in menopausal states. A few patients will be relieved by antibacterial therapy with sulfasuxidine or one of the tetracyclines.

Symptomatic treatment with antihistaminic agents is at times useful. Vasodilation with histamine diphosphate or nicotinic acid has occasionally been successful. Steroids and ACTH may be employed when the patient is acutely ill, the swelling is severe and response to other measures is not adequate. These agents may also be used when the patient has become discouraged with other forms of treatment. Epinephrine is occasionally given for acute exacerbations.

Wolf, A. Ford: Chronic Urticaria, Southern M. J. **50**:436-440 (March) 1957.

Bad Breath

Bad breath, or halitosis, should be considered as a symptom. The two main sources of bad breath are the mouth, and extraoral areas such as the respiratory and digestive tracts.

To differentiate these sources, seal the mouth and have the patient blow forcibly from the nose; then close the nares and have the patient gently exhale through the mouth. The source of the odor should then be apparent.

Extraoral odors may be due to the transfer of odoriferous material dissolved in the blood stream through the alveoli to the expired air. Such substances as garlic, onions, alcohol, acetone, urea, or ammonia can cause characteristic odors on the breath. Usually constipation is not a cause of bad breath.

Chronic or subacute upper respiratory infections such as subacute or chronic tonsillitis, rhinopharyngitis, nasal sinusitis with postnasal drip, tracheitis, and bronchitis can result in halitosis. Certain physiologic states such as menstruation or pregnancy may be associated with abnormal breath odors.

In adolescents, bad breath is usually due to oral causes such as poor oral hygiene, food lodgement areas in the mouth, dental caries, or gingival pockets associated with erupting mandibular molars or gingival bleeding. Orthodontic appliances may contribute to bad breath in some mouths. In adults, oral factors may be abnormally coated tongue, stomatitis, pyorrhea, poor oral hygiene, food debris between and about the teeth, pus and decomposing food in dental pockets and cavities, and prosthetic appliances.

The dentist should eliminate local factors that favor accumulation of food debris. Good oral hygiene should be enforced especially the use of dental floss for removing interdental substances.

Queries and Minor Notes: Cause and Treatment of Bad Breath, JAMA **163**:1200 *(March 30)* 1957.

Leukemia

The incidence of leukemia is definitely on the increase. This increase is noted in children in whom "cancer", usually leukemia, causes more deaths than does any other condition except accidents.

Both acute and chronic leukemia may occur at any age. Usually the acute form is found under 25 and the chronic form is found in those over 25. The greatest incidence of the acute form is in children under five. The chronic forms of leukemia occur most often in men in a ratio of 3 to 1. The acute forms are equally divided between both sexes in children. There

are no apparent geographic, racial, or socioeconomic factors.

Leukemia is a fatal disease of the leukopoietic tissues. It is characterized by extensive and abnormal proliferation of the white blood cells and their precursors. At some time during the course of the disease an increased number of immature white cells are found in the circulating blood.

The leukemias are classified according to the type of abnormal cells predominating as myeloblastic, lymphoblastic, and monoblastic. They are called acute when the life expectancy from time of onset is three months or less; subacute when it is up to one year and chronic when over that period of time.

The etiology is unknown. The two theories considered are that infection plays a role, and that leukemia is a malignant neoplasm. In human leukemia the etiologic importance of only one factor is established, and this is radiant energy. The disease is eight times more common in radiologists than in other members of the medical profession. It must be considered that in some cases, heredity is a factor.

Acute leukemia has an abrupt onset which frequently resembles an acute upper respiratory infection or tonsillitis. Chronic leukemia is insidious in onset and may be far advanced when first evident.

The diagnosis of leukemia is a serious matter. Because of its poor prognosis, one should never make this diagnosis until an adequate blood and marrow study have been made. For the treatment we have general or supportive measures, transfusions and antibiotics which are of use in all types. Also there are different, more or less, specific measures for both acute and chronic forms.

The treatment of acute leukemia is most unsatisfactory. Radiation therapy is of little value and may even do harm. The choice lies between the steroid hormones and the antimetabolites. Irradiation is the main course of treatment for chronic leukemia. Agents that are toxic to hematopoietic tissues and act by partial arrest of maturation are also used.

The estimated life span is purely a guess. The best we can offer is hope for a remission, either spontaneous or drug induced, during which the patient can lead a nearly normal life. No more than 50 per cent of children and 35 per cent of adults will make a good response. The remissions, especially in adults, are often short.

Refresher Article: Leukemia, Medical Times **85**:364-379 (*April*) 1957.

Coronary Occlusion—Emotional Factors

It must be recognized that psychologic factors must be considered in the genesis of a coronary occlusion, and in the reaction of the patient to the disorder. Nearly one-half of patients have gradually mounting emotional tensions for months or even years before occlusion.

About one-tenth of patients have extreme or unexpected emotional stress immediately before the attack. Another 10 per cent have the anniversary-reaction phenomenen, the occurrence of an illness on the anniversary of a significant event in the life of the patient. When seen in coronary patients, the anniversary reaction is probably related to an increase in tension caused by unconscious hostile feelings toward a dead person who was a key figure in the life of the patient. Usually the subject is unaware of this relationship and may claim to be only overworked or overtired. These findings are not apparent in comparable situations in persons hospitalized for other conditions.

The signs of emotional tension antedating coronary occlusion include: (1) increased smoking and drinking, (2) suppressed anger, (3) irritability, (4) insomnia, and (5) inability to make decisions. The patient may become more and more dependent on the spouse. He becomes preoccupied with obsessive thinking or body symptoms and withdraws from social contacts. He complains of failing memory and an inability to concentrate. The coronary age is also the age of diminishing sexual potency. Before occlusion, about one-half of males complain of loss of manhood or of sexual difficulties, such as premature ejaculation.

Reaction to the heart attack is determined by the personality structure of the patient. The normal reactions are anxiety and mood change which gradually disappear as healing progresses. Denial of illness has serious implications. The patient behaves as though illness is not serious, thus adding to the problem of medical care. Suicide is a possibility with the depressed patient, whereas regression may lead to preoccupation with the illness and eventually, psychologic invalidism.

Psychiatric interviews with the cardiac patient have therapeutic value beyond that of uncovering emotional factors in the development of the illness. Benefit may be obtained from discussion of the disturbing events preceding the infarction or from talking about the new fears and problems that are aftermaths of the illness.

Weiss, Edward; Barney, Dlin; Rollin, Henry R.; Fischer, H. Keith; and Bepler, C. R.: Emotional Factors in Coronary Occlusion, Arch. Int. M. **99**:628-631 (*March*) 1957.

Therapeutic Abortion—Indications

Each year in the United States approximately 18,000 therapeutic abortions are completed. The most common indications are toxemia, cardiovascular disease, and neurologic disorders. Although social and economic factors cannot be ignored, these considerations alone can never justify interruption of the pregnancy. At the Mayo Clinic the ratio of therapeutic abortions was 1:223 during the period 1945-1954.

Abortion is done most frequently for toxemia. Some patients have had recent severe toxemia with residual hypertension, impaired renal function, or both. During the past five years, the incidence of abortion has declined because of improved control and better understanding of the condition.

Fewer patients are being aborted

for cardiac reasons as a result of the use of digitalis, salt-free diets, control of weight, rest, and heart surgery. At the same time, heart disease is one of the commonest causes of death on some obstetric services and abortion is often advisable for severe cardiac disease. Patients with previous decompensation or greatly decreased cardiac reserve are prime candidates.

Psychiatric indications are often overused. Therapeutic emptying of uterus may cause great emotional trauma and may even induce psychosis in a patient with a poorly integrated personality.

Multiple sclerosis and epilepsy are the most common neurologic conditions. Both are controversial indications. In general, pregnancy is allowed to continue with multiple sclerosis, unless an exacerbation occurs or the disease is far advanced.

Therapeutic abortion should be considered when renal impairment is grossly demonstrable, as evidenced by albuminuria, retention of nitrogen wastes, and decreased urinary concentration. The problem is more serious when hypertensive cardiovascular disease is also implicated. With early renal disease, interruption is not warranted.

Pulmonary tuberculosis is becoming a less frequent indication because of better control measures during pregnancy. Patients with far advanced active disease, active exudation, or laryngeal complications, or bleeding should be aborted if seen in the first trimester.

Pregnancy may have a relatively unimportant effect on cancer of the breast. Metastatic involvement usually justifies abortion and nonmedical reasons are often important determinants.

Nelson, Gunard A., and Hunter, James S.: Therapeutic Abortion: a Ten-Year Experience, Obstet. Gynec. **9**:284-292 (*March*) 1957.

Hemorrhoids

The problem of hemorrhoids is assuming greater importance at this time. This is true because there are an increasing number of people in the older group where hemorrhoids are common. Also more routine health examinations are being done at the request of patients themselves or their employers; the primary purpose of these procedures being to exclude cancer or potential cancer. And finally there is a large group of persons who seek aid because of rectal symptoms.

Hemorrhoids are masses of varicose veins of the anorectal area. Internal hemorrhoids are masses of varicose veins which originate in the rectum above the anorectal line and are therefore covered with mucous membrane. External hemorrhoids are those that arise distally to that line and are covered with skin. These veins are distensible and vary greatly in size depending upon the intrarectal pressure. This pressure depends upon the position of the patient and upon whether or not he is bearing down as in the act of defecation.

Hemorrhoids are subject to trauma and are in close proximity to potentially infected structures, the anal glands. It is believed that hemorrhoids are not a precancerous lesion as there is no etiologic relationship between them and cancer of the rectum.

Usually, most patients who are found to have anatomic evidence of piles, but without symptoms, are advised against any form of therapy. If rectal symptoms occur it must not be assumed that these symptoms are hemorrhoidal in origin.

Because of their size, large hemorrhoids are more liable to cause symptoms. Hemorrhoids of any size associated with perianal infection cause symptoms because of the inflammatory reaction. These symptoms are rectal bleeding, discomfort often described as a feeling of fullness or lack of complete emptying of the rectum, actual pain, pruritus, protrusion, and soiling. These complaints occur in varying degrees. It is essential to evaluate carefully their severity.

The need for treatment depends upon the symptomatology and upon the size of the hemorrhoids as determined by adequate examination. Asymptomatic hemorrhoids require no treatment. Minimal symptoms indicate either no therapy or palliative treatment, while long standing, annoying complaints usually indicate surgery. An internal inspection of the rectum under direct vision is essential to determine the presence of internal hemorrhoids. Furthermore, the patient must bear down in order to fill the hemorrhoidal veins. Before undertaking the treatment of hemorrhoids, one must be sure to exclude cancer of the rectum or colon.

Nigro, Norman D., and Walker, George L.: Indications for the Treatment of Hemorrhoids. J. Michigan M. Soc. **58**:875-877 (*July*) 1957.

Human Camouflage

With their emotional skin reactions human beings often experience subjectively that they are trying to communicate to others a threat, an alarm, or an appeal. The psychoanalytic session is the scene of reactivation of many such manifestations. In *anger* we flush with hatred and grow "purple with rage" as if we wanted to jump out of our skins. Muscles and vessels are in tension, ready for the jump, and meanwhile we show our teeth, ready to bite. In *shyness* or in *shame* the hot blushing skin covers our nothingness, encompassing, as it were, our naked body. We find such reactions more persistent in patients suffering from rosacea. In *fear* we try to express the feeling of helplessness and lack of power; yet, while appealing for help, simultaneously we attempt to be more threatening. Our rudimentary skin defense tries to behave like the threatening fur of a cat. Cold sweat may break out and we become "white with fear." When disgusted we pull in our lips or show a sour face.

From Human Camouflage and Identification with the Environment by Joost A. M. Meerloo, in *Psychosomatic Medicine* **19**:92 (*March-April*) 1957.

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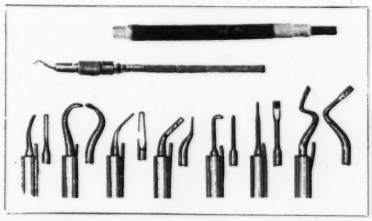

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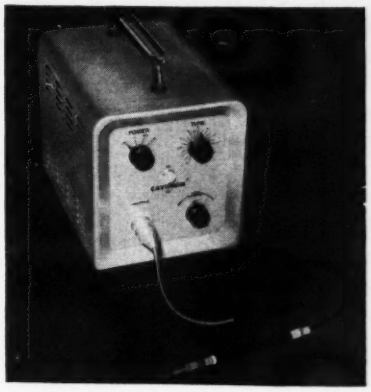

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Our Frequent Failures

Every one of us has failed frequently and often miserably in some treatment procedure. It is hard for us to admit these shortcomings to ourselves and virtually impossible to acknowledge them in public forum. Our ego and our self-importance do not take criticism well. At almost any cost we try to defend our ego-structure from assault. Most of us go to the extreme of protecting our self-esteem by claiming skills and attributes that we either do not possess or that we own in smaller measure than we care to admit. There is nothing notably pathologic in this mechanism of defense, unless it pushes us into a world of fantasy where we lose touch with reality and are no longer capable to perform self-analysis.

We have all exposed pulps by accident, fractured roots during extraction, had our inlays drop out and returned to us in toilet tissue, constructed dentures that were an offense against esthetics and mechanics. The truth is far from him who claims otherwise!

It takes substantial character for us to admit to a patient that what we have done for him is somewhat less than the best. It also takes more than a modicum of character and courage to stand before an audience of dentists and announce our incompetence. I cannot recall that I have heard this done, although I recall many windbags who faced a group of dentists and told how good, clever, and perfect they were (not the group, the windbag).

Few people in the course of history have had the superhuman kind of honesty that it takes to put a catalog of their weakness, vice, and incompetence in writing for all the world to see for all time. Saint Augustine is one notable exception that comes to mind. On the other hand, the literature of mankind has been surfeited with autobiographies written by men who extolled themselves.

So far as I have observed, the dental literature has little of the nature of self-analysis. Most dental case reports describe the great success of a procedure. The recital of errors in diagnosis and treatment is quite unheard. In this respect the medical literature is more mature. There we read frequent reports of failures, both minor and catastrophic.

One of the most refreshingly honest pieces of writing that has come to my attention appeared in the *British Medical Journal:* "The Human Factor as a Cause of Delay in Diagnosis in General Practice." This is the report of ten cases in which the physician who wrote the article described his delays in diagnosis. Six of the patients

(*Continued on page* 554)

suffered from malignant diseases!

Case 9 is that unfortunate kind that lies in the *terra incognito,* or to mix the metaphor in the twilight zone, between medical and dental practice.

"A man aged 77 came to the surgery complaining of a sore mouth. He was edentulous, and on the gum of the left lower jaw at the back of the mouth there was an area of exudate. He wore dentures, and had not had a new set for 15 years. It was felt that this was a traumatic lesion due to rubbing of the dentures, and he was told not to wear them and to see his dentist with a view to obtaining a new set. He was also given a simple mouthwash.

"At his next visit he said that the pain had almost gone, although the area of exudate was still present. About three months later he returned and said that his mouth still troubled him and was sometimes painful. On examination it was obvious that there was an ulcer present, although this was still partly concealed by exudate. The surgeon to whom the patient was sent wrote: 'I agree with you that the ulcer is almost certainly malignant. It has rather rolled everted edges and seems to be involved in the mandible.' A biopsy showed it to be squamous cell carcinoma, and deep -ray therapy was begun.

"The delay in the diagnosis was due to the fact that the practitioner came to the conclusion that the ill-fitting denture was the cause of the trouble, and, when improvement took place, did not follow the case closely. Also, the case was in the borderline between medicine and dentistry, and was receiving treatment from both sources. The most important factor was that the practitioner had not seen a similar case before."

Why do we have such failures? Ignorance is likely a common reason. It is not the only one. A delay in diagnosis and the failure to give adequate treatment is often the result of a "human factor," according to Elliott—Binns, the forthright author of the case reports of self-analysis.

"The human factor may be defined as an attitude of mind of the doctor toward the patient, which influences his judgment in such a way as to make it more difficult for him to come to a correct diagnosis. This factor may be due to the particular circumstances of the interview or to an attitude of mind which has developed over many past interviews.

"In the first type the doctor may be in a frame of mind where his judgment is clouded owing to fatigue, boredom, ill-health, worry, or because he is in too much of a hurry; or he may be irritated by the patient or the circumstances of the patient's visit.

"In the second type the doctor's judgment may be blunted in one of several ways. He may see the patient so often that the visit becomes social rather than medical; he may know the patient to be neurotic or a hypochondriac, and anticipate that all his symptoms are of this type; he may be treating the patient for one particular disease, and discard irrelevant symptoms without adequate consideration. Also he may know the patient

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The first step was to make a master shade guide composed of all the principal tooth shades available. Patients were examined for closest match possible with this master shade guide. It was demonstrated that by the addition of three new shades, the Dura-Blend shade guide offered first choice for accuracy of match more often than any other — in fact, exceeding by 44% the brand scoring second. These new Dura-Blend shades are composed of one quite bright and light, one similar but darker and one quite grey.

13 New Moulds

The new moulds introduced with Myerson's AEsthetic porcelain teeth successfully combined naturalness with cosmetic effects. To offer the same facility in plastic teeth, ten of the most popular upper anterior forms were chosen to be added to the present beautifully carved and characterized Dura-Blend moulds.

Wider Range Increases Convenience

These moulds also will be useful where the following features are indicated:

1. More subtle labial carvings.
2. Slender forms.
3. Longer ridge lap (see Figure 1).

Four of the new upper moulds are square in outline. Three lower moulds, short in relation to width, have been added to increase convenience.

Tested for Detectability

Naturalness is often claimed for artificial teeth without any proof whatsoever. It was decided to actually *test* Dura-Blend teeth for this very important feature.

Representative Dura-Blend teeth were used in an anterior partial. The surrounding natural teeth were characteristic in appearance of good health and good dental care.

Figure 1. Dura-Blend now offers choice of profile (A) Characteristic of new moulds; (B) Typical of many existing moulds.

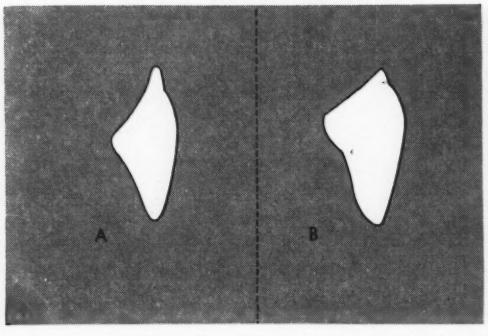
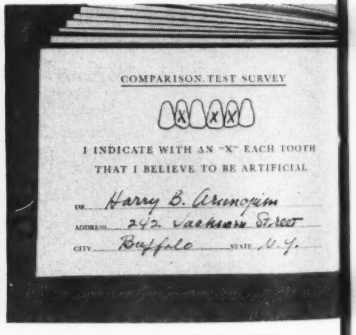


Figure 2. Forms used to record dentists' choices in detectability test.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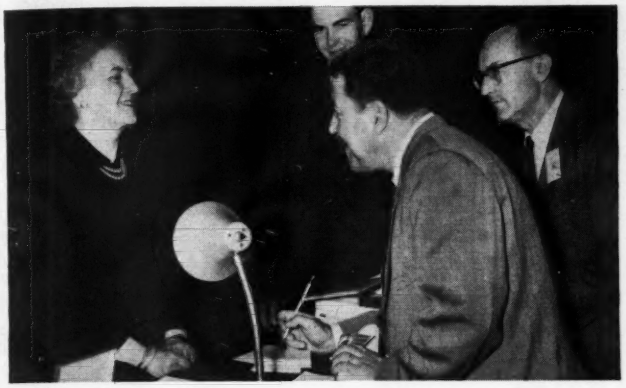

Figure 3. Dentist examining patient at close range in Dura-Blend detectability test.

The patient was displayed at the 1958 meetings of the Dental Society of the State of New York, the Massachusetts Dental Society and the Ontario Dental Society.

Lights were placed so as to give 100 foot candles illumination on the teeth. All dentists attending these meetings were eligible to participate. The patient was placed so that an examination by the dentist with his eye two feet from the patient's teeth was comfortable. The dentist was given a card on which to indicate which teeth were artificial (see Figures 2 and 3).

Results

The results of the test were tabulated separately for each of the meetings. They were so uniform that it became clear that the total for the three meetings was a statistically significant result within the limits required for this test. The results are in Table I. An answer was considered correct when the participant correctly indicated the artificial and the natural teeth. No allowance was made for chance correctness, although many participants commented that they were just guessing.

Table I

Meeting	No. of Participants	No. of Correct	% Correct
Boston	138	11	8.0
Buffalo	112	14	12.5
Toronto	104	13	12.5
TOTAL	354	38	10.7

It is safe to conclude that teeth scoring as shown, under the severe conditions described, are actually *undetectable under ordinary conditions.*

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socially to such an extent that he is unwilling to examine the patient thoroughly—for example, to carry out a rectal or vaginal examination. It is well known that if a doctor treats a person he knows very well—for example, a member of his family—he often treats them badly.

"It is stressed that the patient is neurotic does not imply that a human factor is operating, but only if the patient's neurosis has built up an attitude in the doctor's mind."

The best fortune that can come to some patients is for them to be required to change dentists. I know that this is not the traditional or popularly held belief. It is generally thought, and much is made of it, that a long association between a patient and a dentist results in understanding, confidence, and in the more recent psychologic jargon, rapport. This may indeed be true, but these *human values* do not necessarily mean an excellence of *professional services.*

We may and often do become so attached to a patient as a human being that we do not give him our best in professional care. In such cases we shield and protect the patient and do not wish to subject him to undue pain, discomfort, or expense. The result is that the services that our families, our friends, and our colleagues receive from us are often inferior to those received by patients who are known to us only in the framework of the professional relationship. Without hesitation and with considerable humiliation I plead guilty to this charge!

Before any one of us is too quick to rise to his own defense and reject the indictment, please take a good look at our colleagues (and even ourselves) and answer this question: "Do dentists receive as good dental care as do most non-dentists?" If your observations and experience have been similar to mine, the answer is "No." It is indeed, the "human factor" in operation.

—E.J.R.

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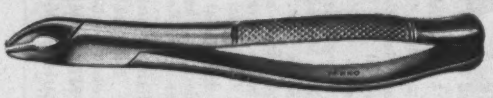

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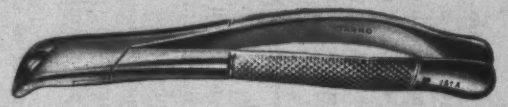
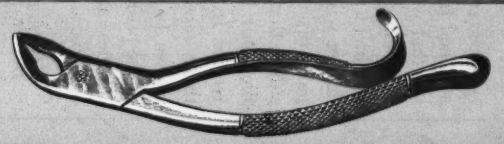
151A For lower first and second bicuspids and sometimes molars. Beaks grasp almost entire lingual and buccal wall. Pressure helps pull crown into opening between beaks for secure hold.



99C For upper centrals, laterals, cuspids, first and second bicuspids. Parallel beaks.

85 For cuspids, bicuspids, molars. Sharp beak edges can be used for breaking down the lingual and buccal plates.



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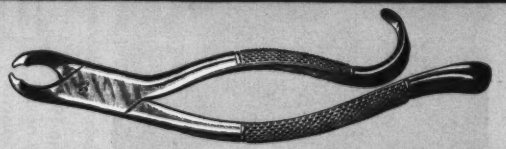

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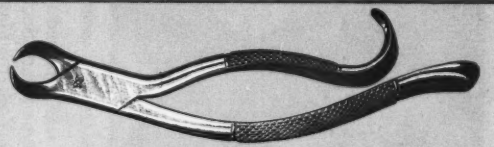

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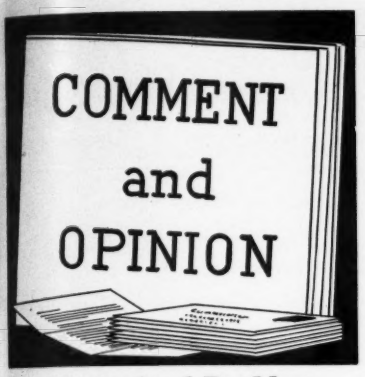
222 For lower third molar. Beaks shaped to avoid interference by second molar. Long enough to remove teeth malposed or partially erupted.



An Unresolved Problem

Dear Editor: It was no surprise to learn that my paper, *Possible Biologic Hazards of Strontium*^{90} *and Fluoridation,* in the February, 1958 issue of DENTAL DIGEST evoked considerable concern and comment. Strontium^{90} and fluoride are at present very much in the public mind. While, as expected, comment ran pro and con, it was gratifying to learn that most of it was favorable to the thesis of my article.

I am directing this communication to some critical letters which appeared in the July, 1958 issue of DENTAL DIGEST. Specifically I refer to the communications of Doctor Brudevold and Doctors McConnell and Robinson respectively.[1] Their criticism in essence concentrates on opinion, that strontium fluoride cannot form in the human body. In postulating the possible formation of strontium fluoride I may have oversimplified the problem, but it should not be taken that this excludes the possible formation of other complex compounds in the physiologic environment which incorporate strontium and fluoride. This also, does not alter my thesis; on the contrary, it extends it.

Doctor Brudevold expresses a belief, held by many, that these two elements substitute for calcium and hydroxyl in the hydroxyapatite structure assumed for bone mineral. If this is the case it is quite evident that fluoride and Strontium^{90} may well find themselves in the same molecule. This certainly does not negate the interacting potentialities of fluoride and strontium. On the other hand, in the

[1]Comment and Opinion, DENTAL DIGEST **661**: 324-328 (July) 1958.

CLINICAL AND LABORATORY SUGGESTIONS

(*See pages* 546 *and* 547)

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respected opinion of other investigators, the spatial structure limits the amount of strontium which may enter the hydroxyapatite crystal and these investigators indicate that additional mechanisms for the deposition of strontium must be sought.[2] This of course touches lightly on the different thinking concerning the disposition of marginal elements such as fluoride, strontium, radium, lead, in bone tissues and calcifying systems. It should be clear that the disposition of such elements within the body is not fully understood or known. The same may be said of the solubility relationship within the physiologic environment. Because of the many factors involved, the solubility of bone salt in the body is not an established certainty.[3]

On the matter of solubility it is interesting in this respect to draw attention to the confusion and contradictions relating to calcium and strontium. Thus, Doctor Brudevold seems to lay great stress on the relative "test tube solubilities" of calcium and strontium. Just how this concerns the possibilities under the dynamics of physiologic conditions he does not make clear. He relates the solubility of strontium fluoride to calcium fluoride and therefore considers the former quite soluble. Doctors McConnell and Robinson acknowledge the lesser solubility of calcium fluoride but still regard strontium fluoride as highly insoluble. A communication from Doctor J. L. Kulp[4] informs me that the insolubility of strontium fluoride is so great as to preclude the absorption via the intestinal tract. On this basis the absorption of calcium fluoride would suffer a similar fate.

Regardless of the above opinions, and the apparent confusion they reflect it is known that fluoride gains access to the body even when ingested in many insoluble forms. Furthermore, it is an established fact that fluoride and strontium are found in the body and retained in identical tissues. Doctor Brudevold's investigation provides evidence of this. Apparently the above critical considerations lean too heavily on sterile chemical deduction and too little on physiologic reality.

Doctor Brudevold seems to contradict his serious concern over the hazard of Strontium^{90} in teeth if we are to believe an item quoting him in the April 15, 1958 issue of *Dental Times*. Does he mean to infer that the possible interaction of additional toxic substances eliminates the hazards which he fears, or does he mean to imply that no potentiating effect may be expected by the interaction of Strontium^{90} and fluoride within the body tissues? It would seem that Doctor Brudevold and the other critics have missed the salient point of my discussion. Doctor Brudevold cannot escape the fact that his own research demonstrates the intimate presence of strontium and fluoride in identical tissues, regardless of how one may believe strontium and fluoride are combined. Furthermore, Doctor

---

[2]Engstrom, A., et al.: Bone and Radioactive Strontium, New York, John Wiley & Sons, Inc., 1958.
[3]Neuman, N. F., and Margaret, W.: The Chemical Dynamics of Bone Mineral, Chicago, University of Chicago Press, 1958. Chapter 2.
[4]Kulp, J. L.: Columbia University, New York, Personal Communication.

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Brudevold apparently makes reference to material which was recently published in the *Journal of the American Dental Association*[5], to support his contentions. His findings are essentially analytical determinations for strontium and fluoride made with a limited number of teeth gathered from a few highly divergent communities. These results do not represent the findings procurable from controlled experimentation designed to determine the effect of known intakes of strontium and fluoride in relation to tooth composition and possibly related physiologic effects. Conversely, the values he reports are related to unknown intakes and unknown exposures, and the results, as would be expected, are purely adventitious. His conclusions are unwarranted and have little meaning.

It would be a great mistake to leave the resolution of this important matter solely to the hazard of opinion, no matter how expert. These critics have not been responsive to the general thesis of my discussion since the all-important matter of toxic interaction between the elements under consideration received virtually no attention. Nevertheless, we are confronted with the reality of an increased intake of both fluoride and Strontium^{90}, both highly toxic substances, as a result of fluoridation and radioactive fallout affecting increasingly larger sections of the population. Apparently it is necessary to reiterate some of the salient points of my thesis:

1. Fluoride is definitely established as a toxic substance and evidence of its toxicity is known even when the intake is occasioned via water supply containing less than one ppm fluoride.

2. It is commonly accepted that Strontium^{90} is a highly toxic element and the cause of widespread apprehension at the present time.

3. Both elements may be found in the human body. Fluoridation and radioactive fallout are presently responsible for a general increase in their intake by large sections of the population.

4. Both elements are bone seekers and tend to accumulate in and damage such tissues; it is likely that they may accumulate also in tissues subject to pathologic calcification.

5. Recent findings confirm earlier suspicions that relatively high concentrations of fluoride can accumulate in the soft tissues of the body. The primary effect of such accumulations and the potentiating action of a fluoride-Strontium^{90} combination in such sites is one of the major questions raised in my discussion.

6. Since the study of Volker[6], it is generally accepted that increase in fluoride content decreases the effective solubility of bone mineral which seems to be a basis for the chronic toxic effects of fluoride at low levels of intake. This may well influence the retention of Strontium^{90}.

(*Continued on page* 560)

[5]Steadman, Luville T.; Brudevold, Finn; and Smith, Frank A.: Distribution of Strontium in Teeth from Different Geographic Areas, JADA **57**:340-344 (Sept.) 1958.

[6]Volker, J. F.: Effect of Fluorine on the Solubility of Enamel and Dentine, Proc. Soc. Eper. Biology and Med. **42**:725 (Dec.) 1939.

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7. When a water supply is fluoridated to the 1 ppm level it has been estimated that the fluoride intake of the average person is increased by about 300 per cent.

8. In view of the widespread discussion concerning the Strontium^{90} hazard it would be pointless to dwell on its importance beyond passing mention.

9. It is definitely known that fluoride is an enzyme poison and inhibitor. Some enzymes are inhibited by extremely low concentrations of fluoride, considerably less than that which has been found in the bony and soft tissues. Since enzymic disturbances are fundamental factors in disease processes it would be a grave error to dismiss this factor as well as the possible complicating effects which may result from a fluoride-Strontium^{90} interaction.

10. Above all it should be clear that the evaluation of the toxic interaction of fluoride and Strontium^{90} is an unresolved matter and hence the questions raised in my discussion remain unanswered.

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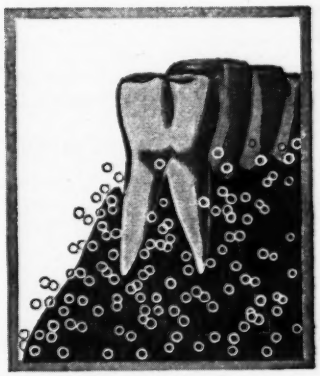

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1. *Oxygen uptake by normal and inflamed gingiva and saliva. Schrader and Schrader. Helvets. odont. acta. 1 13-16 April 1957.*

2. *The New York Hospital–Cornell Medical Center. Presented as a Scientific Exhibit at the American Dental Association Annual Session, November, 1957.*

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